PB86-172434

Superfund Record of Decision (EPA Region 2)
Sinclair Refinery Site
Wellsville, New York September 1985

(U.S.) Environmental Protection Agency
Washington, DC

30 Sep 85

U.S. Department of Commerce
National Technical Information Service
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Emergency and
Remedial Response

EPA/ROD/R02-85/017
September 1985

PB86-172434

EPA

Superfund Record of Decision:

Sinclair Refinery, NY

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TECHNICAL REPORT DATA

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1. REPORT NO. EPA/ROD/R02-85/017	**2.**	**3. RECIPIENT'S ACCESSION NO.** PB86 172434/AS
4. TITLE AND SUBTITLE SUPERFUND RECORD OF DECISION Sinclair Refinery, NY		**5. REPORT DATE** September 30, 1985
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)		**8. PERFORMING ORGANIZATION REPORT NO.**
9. PERFORMING ORGANIZATION NAME AND ADDRESS Same as box 12.		**10. PROGRAM ELEMENT NO.**
		11. CONTRACT/GRANT NO.
12. SPONSORING AGENCY NAME AND ADDRESS U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460		**13. TYPE OF REPORT AND PERIOD COVERED** Final ROD Report
		14. SPONSORING AGENCY CODE 800/00

15. SUPPLEMENTARY NOTES

16. ABSTRACT

The former 103-acre Sinclair Oil Refinery is located in the Town of Wellsville, Allegany County, New York. The site was originally developed as an oil refinery during the late 1800s and was operated by the Wellsville Refining Company. Products manufactured at the site included lubricating oils and grease, fuel oil, naptha, gasoline, lighter fluid and paraffin. In 1924, the Wellsville Refining Company sold the property and plant to Sinclair Refining Company which maintained and operated the refinery until 1958, when operations ceased as a result of a fire. While the refinery was in operation, the southernmost portion of the property was used as a landfill to dispose of approximately 230,000 yd^3 of wastes. Substances deposited in the landfill consisted of drummed waste, oily and tarry sludges, and hazardous waste compounds in other forms. The landfill consists of the "Central Elevated Landfill Area" (CELA), a 9.2-acre landfilled area to the north, the 2.3-acre "South Landfill Area" (SLA) to the south, and a 1-acre sand and gravel borrow area between the two landfilled areas. This 12.5 acre landfill sub-site is considered in this Record of Decision (ROD).

The selected remedial action for this site includes: removal and offsite disposal of approximately 300 drums on the surface of the CELA; excavation of the 2.3-acre SLA to a depth of approximately 20 feet to remove all waste material; filling of the excavated area with clean fill; consolidation of the excavated SLA wastes onto the (see separate sheet)

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Record of Decision Sinclair Refinery, NY Contaminated Media: soil Key contaminants: VOCs, heavy metals, arsenic, chromium, phenols		

Dis.

18. DISTRIBUTION STATEMENT	**19. SECURITY CLASS** *(This Report)* None	**21. NO. OF PAGES** 128
	20. SECURITY CLASS *(This page)* None	**22. PRICE**

Abstract - continued

CELA; RCRA capping of the consolidated wastes on the CELA; partial channelization of the Genesee River to protect the landfill from erosion and flooding; and erection of a fence to secure the entire Landfill area. Total capital cost for the selected remedial alternative is estimated to be $8,759,000 with O&M costs approximately $30,000 per year. A separate ROD will be prepared to address cleanup of the refinery area once the Feasibility Study is complete.

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i.b

Record of Decision
Remedial Alternative Selection

Site:

Sinclair Refinery site, Village of Wellsville, New York

Documents Reviewed:

I am basing my decision primarily on the following documents describing the analysis of the cost-effectiveness of remedial alternatives at the Sinclair Refinery site:

- Remedial Action Master Plan, CH2M Hill, April 27, 1983.
- Phase I Remedial Investigation Sinclair Refinery Site, SMC Martin, March 14, 1985.
- Fast-Track Feasibility Study of Initial Remedial Measures for Wellsville Water Supply, SMC Martin Inc., May 1985.
- Feasibility Study for the Sinclair Refinery Site Landfill, SMC Martin, August 1985.
- Staff summaries, memoranda, letters, and recommendations.
- Summary of Remedial Action Alternative Selection - Sinclair Refinery Site.

Description of Selected Remedy:

- Removal and off-site disposal of approximately 300 drums on the surface of the Central Elevated Landfill Area.
- Excavation of the wastes from the 2.3-acre South Landfill Area.
- Filling of the excavated area with clean fill.

- Consolidation of the excavated South Landfill Area wastes onto the Central Elevated Landfill Area.
- RCRA capping of the consolidated wastes on the Central Elevated Landfill Area.
- Partial Genesee River Channelization to protect the landfill from erosion and flood inundation from the Genesee River.
- Erection of a fence to secure the entire Landfill site.

Declarations:

Consistent with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), and the National Contingency Plan (40 CFR Part 300), I have determined that the selected strategy for the Sinclair Refinery site landfill is a cost-effective remedy, and that it effectively mitigates and minimizes existing and potential damage to, and provides adequate protection of public health, welfare and the environment.

I have also determined that the action being taken is appropriate when balanced against the availability of Trust Fund monies for use at other sites.

The Region has consulted with the State of New York in selecting the recommended remedial action for this site. The State concurs that this is the most appropriate remedial measure for the Sinclair Refinery site landfill.

SEPTEMBER 30 1985
Date

Christopher J. Daggett
Regional Administrator

Summary of Remedial Alternatives Selection
Sinclair Refinery Site

Site Location and Description

•Site Location

The former 103-acre Sinclair Oil Refinery, located in Allegany County, New York in the Town of Wellsville, southeast of the Village of Wellsville, is bounded on the west by Brooklyn Street, on the north by a residential area, and on the south and east by the Genesee River. The population of Wellsville, estimated to be 6,000 residents, is served by an aging water treatment plant built in 1921. The intake of the treatment plant is located approximately one-half mile downstream of the northern-most extremity of the Sinclair Refinery site (see Figures 1 and 2).

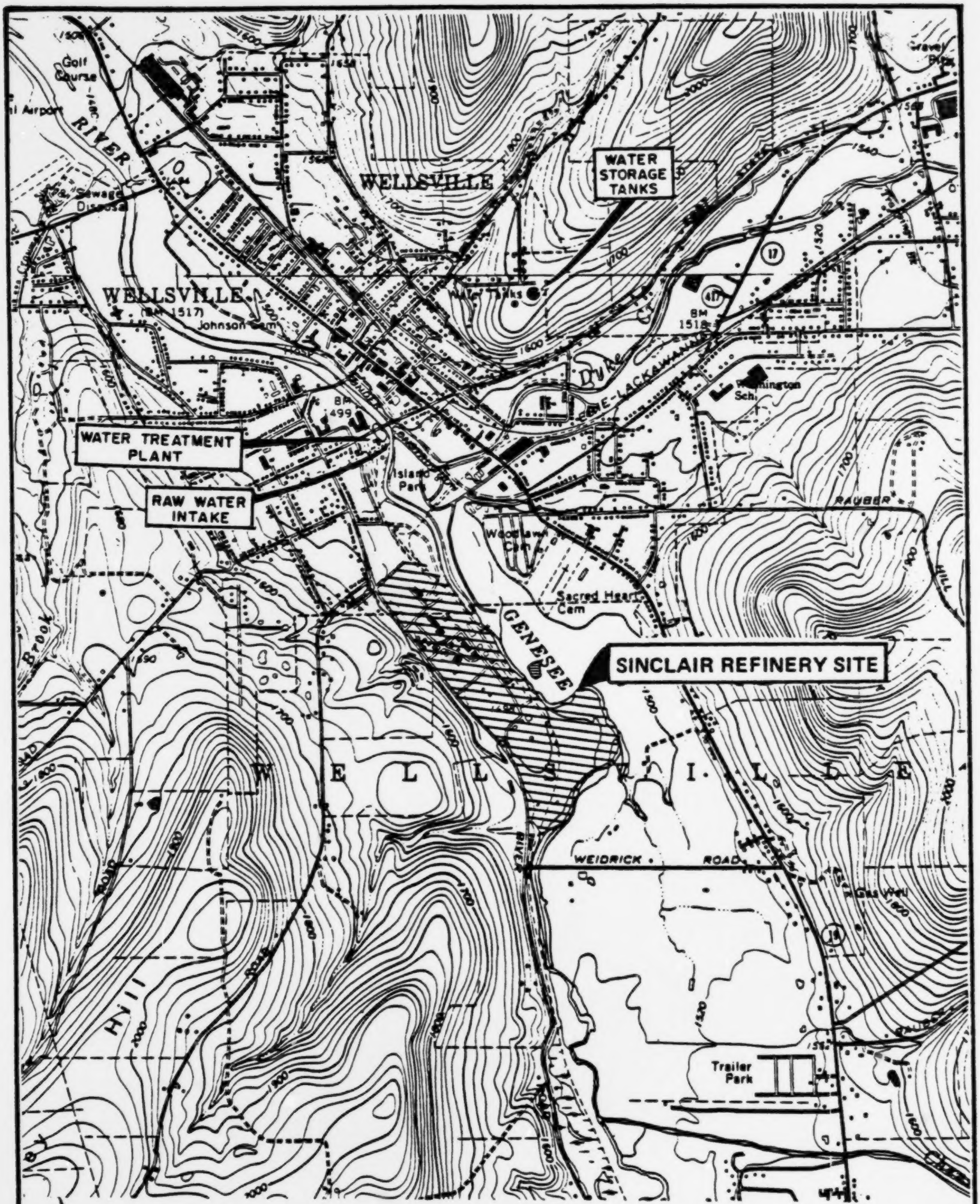
•Site Description

For the purposes of this project, the Sinclair Refinery site is considered as two sub-sites: the refinery portion of the site, consisting of approximately 90 acres where the original refinery operations took place, now utilized as a light industrial park and agricultural and technical college campus; and the 12.5-acre landfill portion, which accepted wastes from the refinery operation.

The fenced landfill is located along the Genesee River in the southeastern part of the site. The landfill sub-site consists of the "Central Elevated Landfill Area" (CELA), a 9.2-acre landfilled area to the north, the 2.3-acre "South Landfill Area" (SLA) to the south, and a 1-acre sand and gravel borrow area between the two landfilled areas (see Figure 3). The 12.5 acre landfill sub-site is considered in this Record of Decision (ROD). Upon completion of a Feasibility Study for the refinery portion of the site, a separate ROD will be prepared.

Layers of fill and black-stained material are visible in the 10 foot high, several hundred foot long segment of the landfill that was subjected to erosion by the Genesee River (see Site History section of this ROD). Standing water between the landfill and the protective dike constructed in 1983 often has an oily sheen on the surface.

- 3 -


WATER STORAGE TANKS
WATER TREATMENT PLANT
RAW WATER INTAKE
SINCLAIR REFINERY SITE
WELLSVILLE
WELLSVILLE
W E L L S V I L L E
GENESEE
RIVER
Golf Course
Airport
Sewage Disposal
Johnson Cem
Water Tanks
BM 1517
BM 1518
BM 1499
ERIE-LACKAWANNA
Remington Sch
Island Park
Woodlawn Cem
Sacred Heart Cem
RAUBER
HILL
Brook
WEIDRICK ROAD
Gas Well
Trailer Park
17
417
19
N

SCALE : 1" =2000'

Sinclair Refinery, Vicinity Map

Reproduced from best available copy.

Figure 1

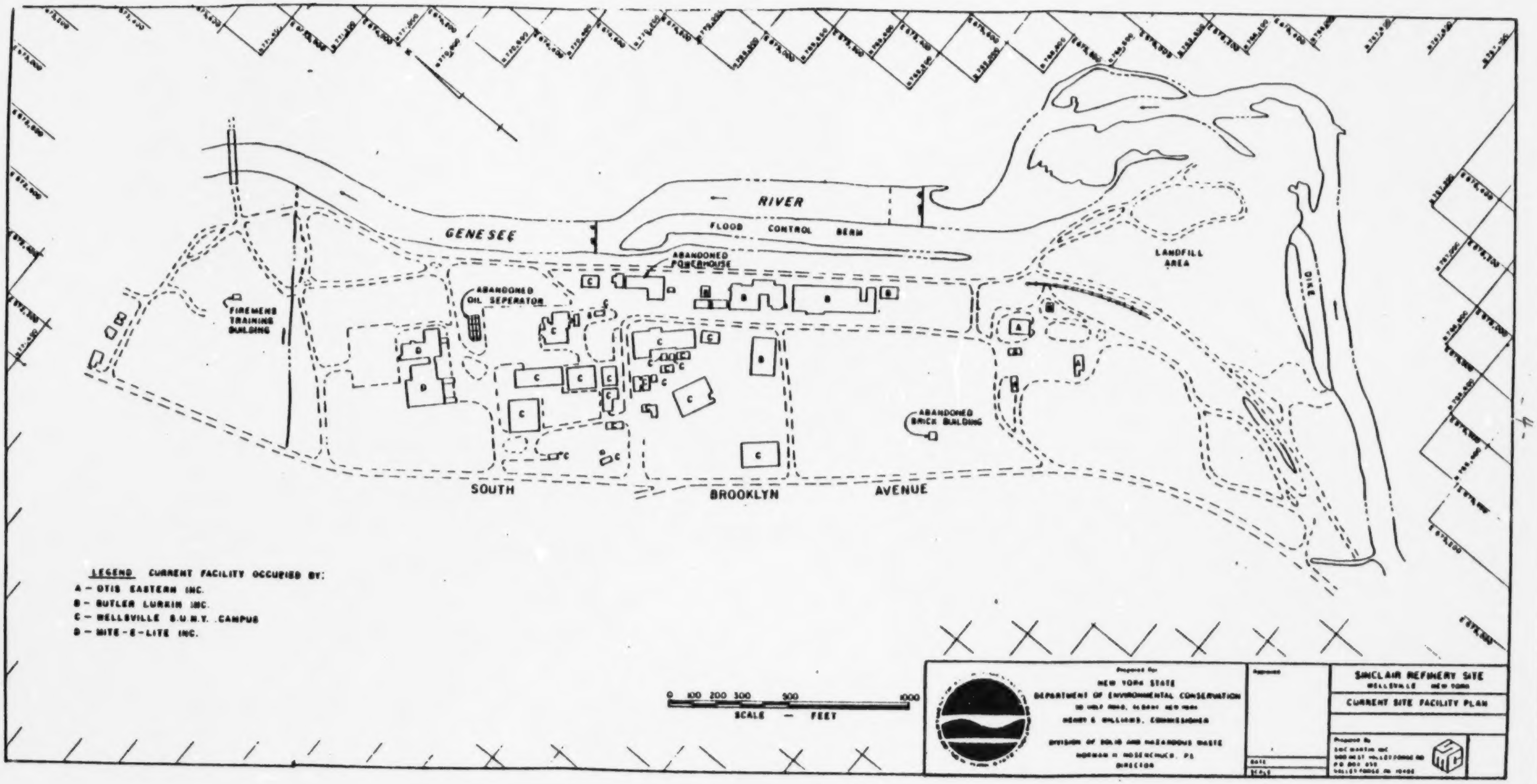
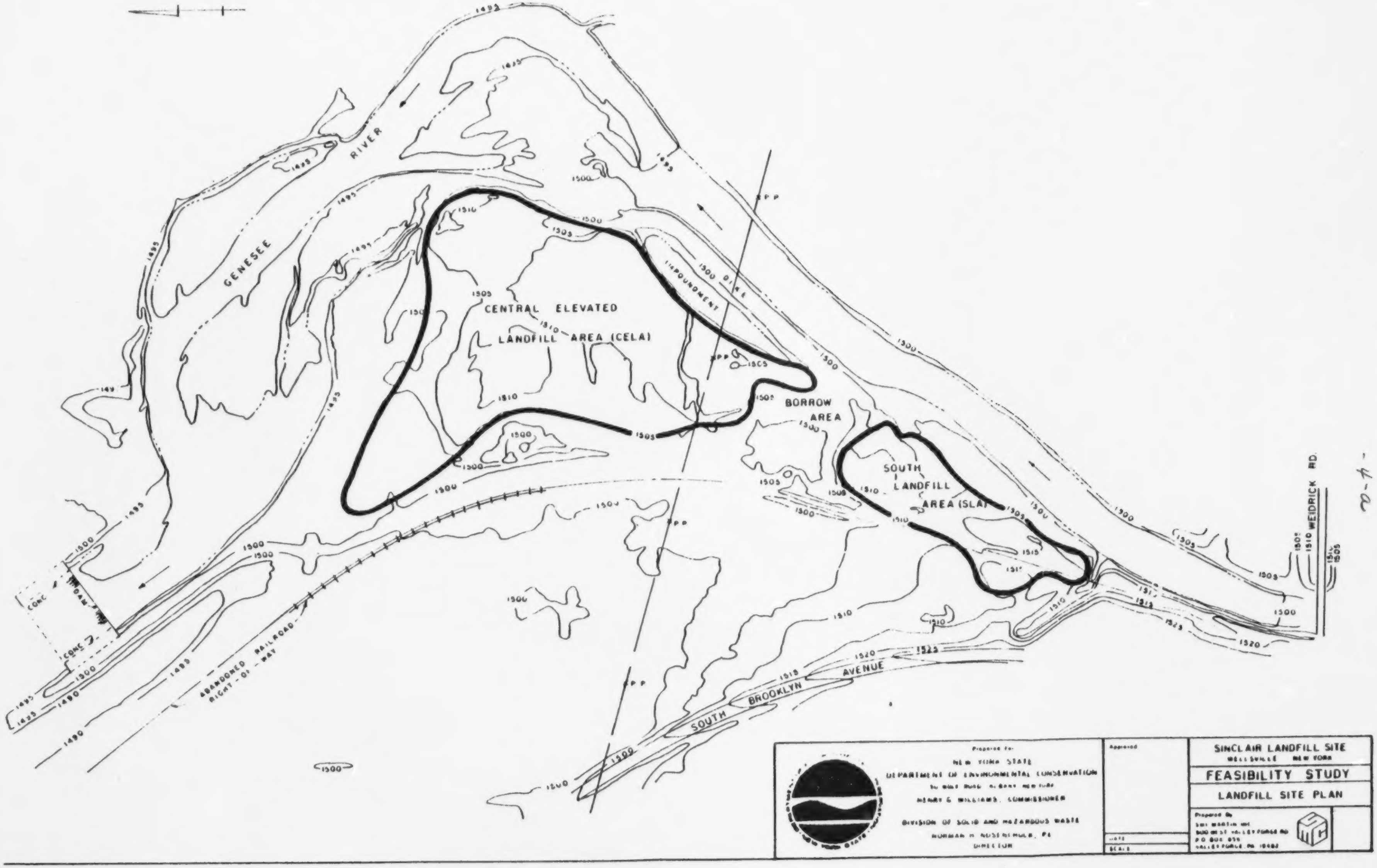

GENESEE
RIVER
FLOOD CONTROL BERM
ABANDONED POWERHOUSE
ABANDONED OIL SEPERATOR
FIREMENS TRAINING BUILDING
ABANDONED BRICK BUILDING
LANDFILL AREA
DIKE
SOUTH BROOKLYN AVENUE
A
B
C
D
LEGEND CURRENT FACILITY OCCUPIED BY:
A – OTIS EASTERN INC.
B – BUTLER LURKIN INC.
C – WELLSVILLE S.U.N.Y. CAMPUS
D – MITE-E-LITE INC.
0 100 200 300 500 1000
SCALE — FEET
Prepared for
NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
50 WOLF ROAD, ALBANY NEW YORK
HENRY G. WILLIAMS, COMMISSIONER
DIVISION OF SOLID AND HAZARDOUS WASTE
NORMAN H. NOSENCHUCK, P.E.
DIRECTOR
Approved
Date
Scale
SINCLAIR REFINERY SITE
WELLSVILLE NEW YORK
CURRENT SITE FACILITY PLAN
Prepared By
SMC MARTIN INC
900 WEST VALLEY FORGE RD
P.O. BOX 859
VALLEY FORGE PA 19482

Figure 2


GENESEE
RIVER
CENTRAL ELEVATED
LANDFILL AREA (CELA)
BORROW
AREA
SOUTH
LANDFILL
AREA (SLA)
IMPOUNDMENT
DIKE
WEIDRICK RD.
SOUTH BROOKLYN AVENUE
ABANDONED RAILROAD
RIGHT-OF-WAY
CONC
DAM
CONC
PP
1490
1495
1500
1505
1510
1515
1520
1525
Prepared for:
NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
50 WOLF ROAD ALBANY NEW YORK
HENRY G. WILLIAMS, COMMISSIONER
DIVISION OF SOLID AND HAZARDOUS WASTE
NORMAN H. NOSENCHUCK, P.E.
DIRECTOR
Approved
DATE
SCALE
SINCLAIR LANDFILL SITE
WELLSVILLE NEW YORK
FEASIBILITY STUDY
LANDFILL SITE PLAN
Prepared By
SMC MARTIN INC
900 WEST VALLEY FORGE RD
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VALLEY FORGE PA 19482

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Figure 3

The landfill, wooded and covered with vegetation, has approximately 300 rusted and corroding 55-gallon drums located in several locations on the surface. The majority of these drums are empty. It is believed that hundreds of drums are buried in the landfill. A small pool of oil, probably the remains of a lagoon, is located on the top of the landfill. A chainlink fence partially restricts access to the landfill from the roadway. Access from the river bank is unrestricted.

The Village of Wellsville lies within the Genesee River Basin near the headwaters of the Genesee River. The river follows a northern path across the entire Southwestern Plateau and the Erie-Ontario Plain before it empties into Lake Ontario at Rochester, New York. The Sinclair Refinery site, located on the floodplain deposits of the river, has the west bank of the river as its eastern boundary.

°Hydrology and Surface Drainage

The hydrology of the site is dominated by the northward-flowing Genesee River, which has been modified in this area in recent years by flood control measures implemented by the U.S. Army Corps of Engineers. After severe flooding in 1972, the river underwent channelization, bank stabilization, and diversion. Several check dams have also been constructed. A dike built in 1983 to prevent erosion of the landfill further modified stream flow patterns. Dyke Creek, a tributary, enters the Genesee River approximately 1.25 miles downstream from the landfill site.

Surface drainage in the landfill area appears to be dominated by overland flow. The surface material on the CELA is relatively impermeable, indicated by standing water and marshy areas on the top of the landfill. These conditions are the result of an impermeable material placed over the landfill.

Hydrology

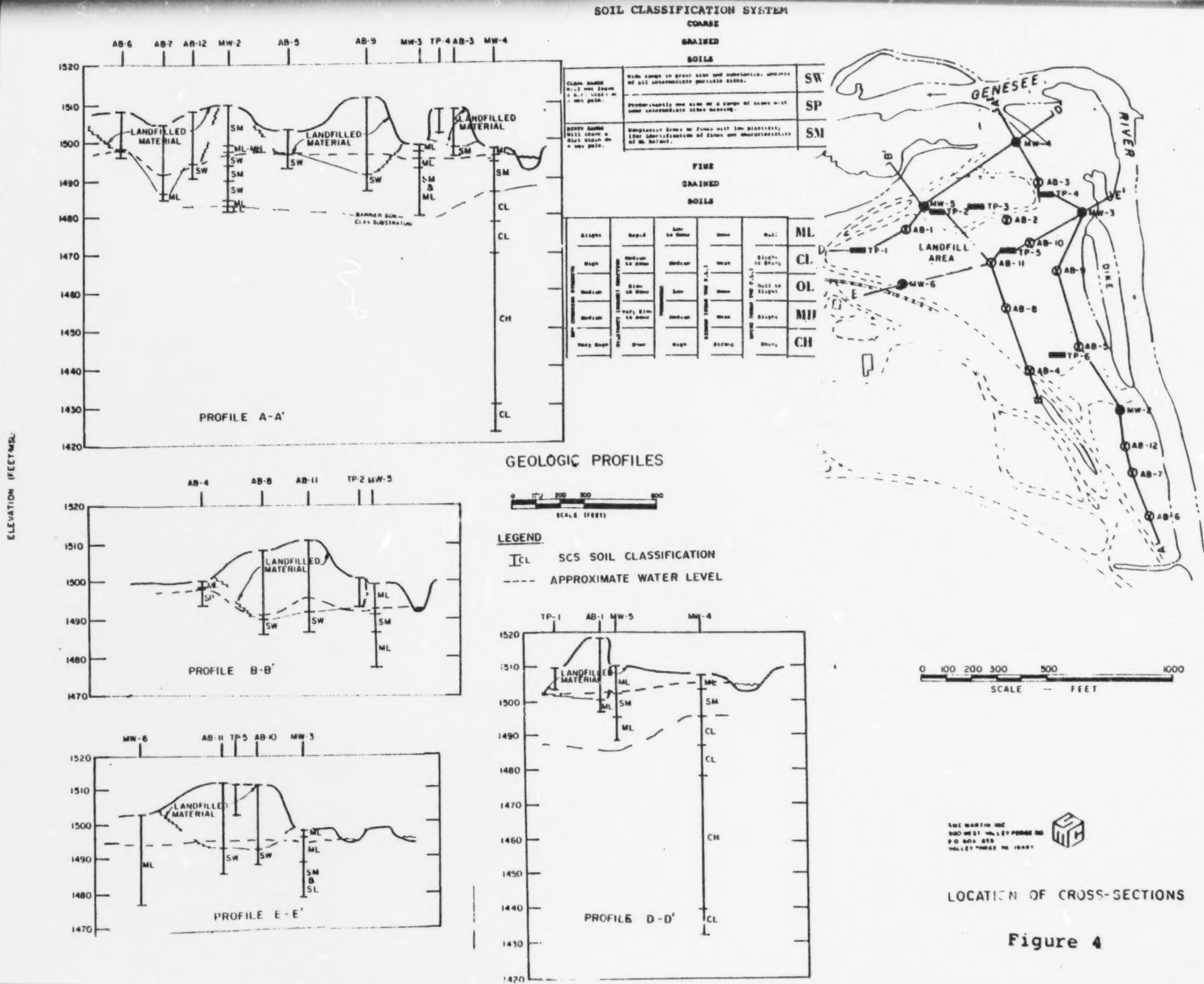
Figure 4 presents a generalized geologic cross-section through the site. The site is directly underlain by unconsolidated deposits consisting of sands, silts, clays, and gravels. The near-surface deposits are Holocene channel and overbank deposits of the Genesee River. The coarser grained sands and gravels tend to be well-sorted and are present as lenses and thin, discontinuous sheets separated by layers of finer-grained deposits. Alluvial deposits are at least 10 to 25 feet thick over much of the site.

Beneath the alluvial sediments lie glacial deposits of the Pleistocene age. Although the glacial and alluvial deposits are difficult to distinguish from one another, based on field observations, it is believed that the clay unit encountered in several boreholes represents a glacio-lacustrine deposit. The thickness of the clay substratum appears to pinch out to the west ranging from at least 35 feet along South Brooklyn Avenue to over 60 feet along the Genesee River.

During the deglaciation of the northward-sloping Genesee River Valley, northward-receding ice masses blocked the drainage of meltwater, forming large lakes. These lakes were the sites for accumulations of great thicknesses of fine grained (clay and silt) lacustrine deposits. A general upward decreasing grain size at this location suggests that an ancient or buried river channel once existed west of the Genesee River (SMC Martin).

The glacial deposits are underlain by bedrock of Devonian age. Although no site-specific data has been acquired on the nature of this bedrock, regional data indicate that it is composed of sandstones, shales, and conglomerates. Seismic data collected for this investigation indicate that the depth to bedrock varies from approximately 70 feet near South Brooklyn Avenue to over 250 feet in the southeastern corner of the site. This slope in the bedrock surface reflects either a deeper pre-glacial Genesee River or a deepening of the valley by advancing glaciers (SMC Martin).

Geomorphologically, this area is within the Allegany Plateau Physiographic Province, characterized by a deeply incised dendritic drainage pattern and broad, flat discontinuous ridges.


SOIL CLASSIFICATION SYSTEM
COARSE GRAINED SOILS
SW
SP
SM
FINE GRAINED SOILS
ML
CL
OL
MH
CH
ELEVATION (FEET MSL)
AB-6
AB-7
AB-12
MW-2
AB-5
AB-9
MW-3
TP-4
AB-3
MW-4
LANDFILLED MATERIAL
BARRIER SILT-CLAY SUBSTRATUM
PROFILE A-A'
GEOLOGIC PROFILES
SCALE (FEET)
LEGEND
SCS SOIL CLASSIFICATION
APPROXIMATE WATER LEVEL
AB-4
AB-8
AB-11
TP-2
MW-5
PROFILE B-B'
MW-6
TP-5
AB-10
PROFILE E-E'
TP-1
AB-1
PROFILE D-D'
GENESEE RIVER
DIKE
LANDFILL AREA
AB-2
TP-3
TP-6
SCALE — FEET
0
100
200
300
500
1000
1520
1510
1500
1490
1480
1470
1460
1450
1440
1430
1420

LOCATION OF CROSS-SECTIONS

Figure 4

The uppermost aquifer, an unconfined water table aquifer, is found at relatively shallow depths beneath the site. In the landfill area, the depths to the water table surface were measured in the range of 3 to 17 feet, with the depth-to-water at most locations in the elevated portions of the landfill greater than 10 feet. Water from this aquifer discharges into the Genesee River. The average ground-water flow velocity in the uppermost aquifer is approximately 0.91 ft/day. Velocities tend to be lower in the central portion of the site and higher at wells adjacent to the Genesee River. At this rate, it is estimated that it would take about 1.2 years for ground water flowing from the central portion of the landfill to reach the Genesee River. Fluctuations in the water levels observed over a three and one-half month period averaged 1.14 feet. Fluctuations were observed to be greater in those wells installed closest to the river, particularly in the landfill area where maximum fluctuation were observed on the north side. These fluctuations are apparently related to river stage, with high water tables corresponding to high river stages, and with low water levels occurring together in the river and the aquifer, illustrating that the Genesee River is a significant hydrologic boundary (SMC Martin). Figure 5 illustrates water level elevations and ground water flow direction.

Topography at the site is relatively flat, with a steep drop to the river on the east, and a steep climb into the hills to the west. The local relief ranges from approximately 1,500 to 2,100 feet above mean sea level. The landfill exhibits greater topographic diversity where the topography has been altered by landfilling and earthmoving operations.

The water table in the landfill area is significantly influenced by the local topography and the nature of the landfilled material. The variable thicknesses and permeabilities of the wastes deposited in this area have apparently altered the natural ground-water flow patterns. Ground water in the southern part of the landfill area flows in a northerly-easterly direction towards the river.

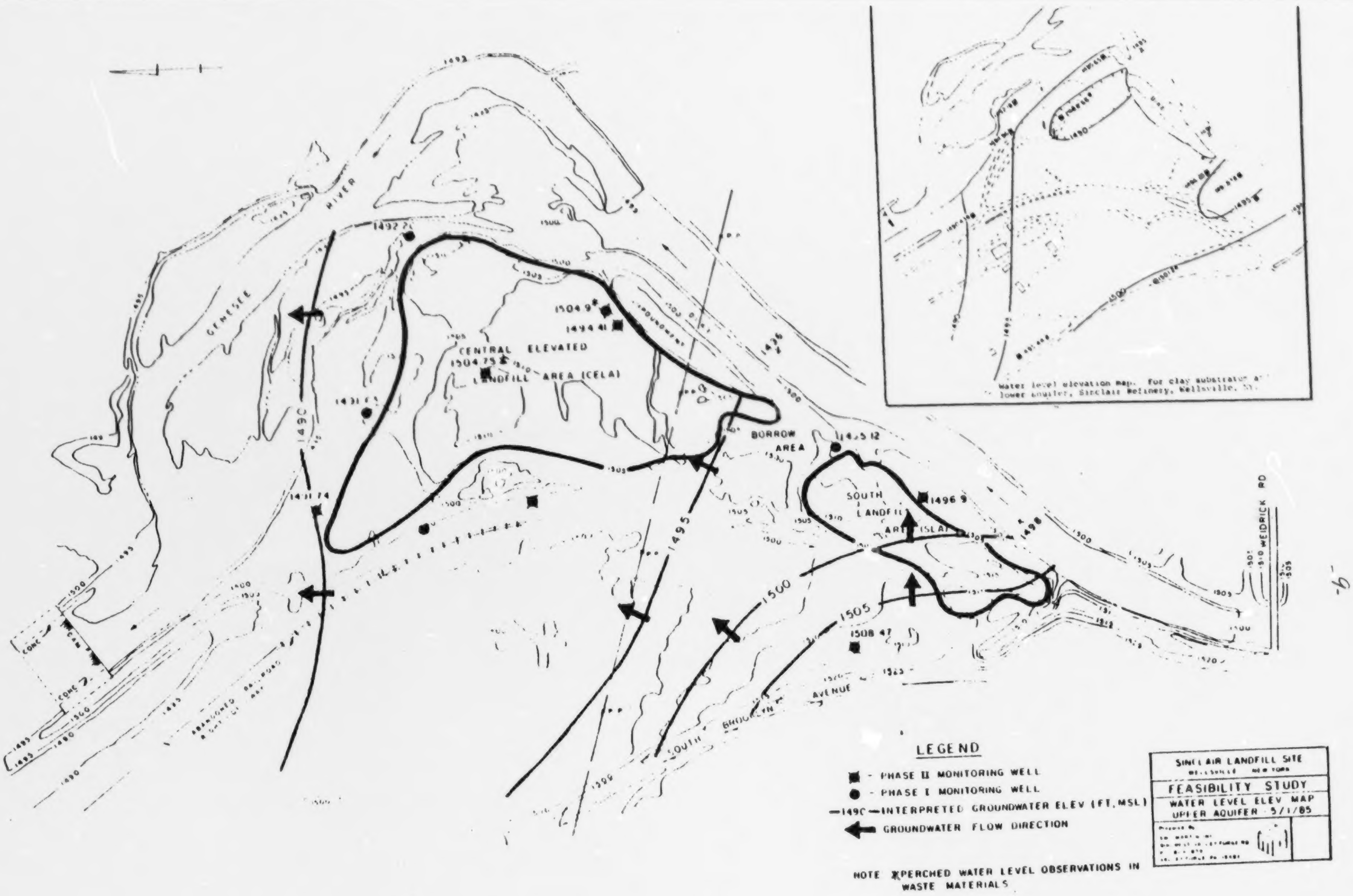

Water level elevation map. For clay substrate and lower aquifer, Sinclair Refinery, Wellsville, NY.
GENESEE RIVER
1492.2
1491.6
1491.74
1490
1495
1500
1505
1498
CENTRAL ELEVATED LANDFILL AREA (CELA)
1504.75
1504.9
1494.41
BORROW AREA
1495.12
SOUTH LANDFILL AREA (SLA)
1496.9
1508.47
WEIDRICK RD
SOUTH BROOKLYN AVENUE
ABANDONED RAILROAD RIGHT OF WAY
CONC
LEGEND
■ - PHASE II MONITORING WELL
● - PHASE I MONITORING WELL
—149C— INTERPRETED GROUNDWATER ELEV (FT, MSL)
← GROUNDWATER FLOW DIRECTION
NOTE * PERCHED WATER LEVEL OBSERVATIONS IN WASTE MATERIALS
SINCLAIR LANDFILL SITE
WELLSVILLE NEW YORK
FEASIBILITY STUDY
WATER LEVEL ELEV MAP
UPPER AQUIFER 5/1/85

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Figure 5

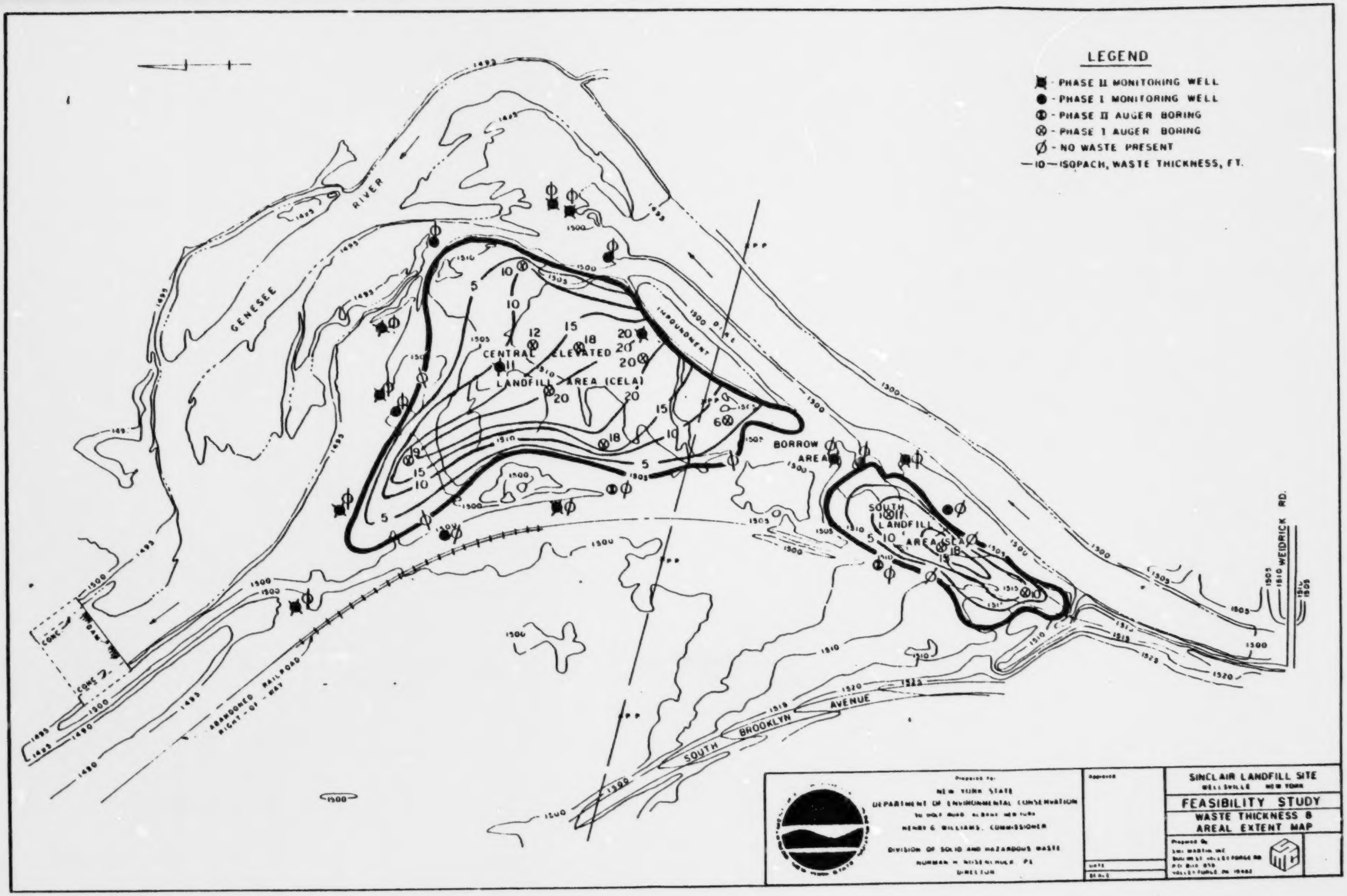
In the northern portion of the landfill area, there appears to be perched water or mounding of the ground water at a topographic high. The water observed at this location may not be directly connected hydraulically to the uppermost aquifer. Instead, it may represent water pooled in a basin with a relatively impermeable bottom of oil- or sludge-infiltrated soil. A depressed water table is indicated south of this area and west of the dike pool. This area lies in a topographic low between landfilled areas to the north and south. Ground water in this area apparently flows from the topographically high landfilled areas into the depression. (SMC Martin).

•Landfilled Waste Characteristics

Seismic and resistivity surveys conducted in the landfill area identified geophysically anomalous zones which were most likely related to surface and subsurface contamination. Seismic velocities of the surface material in the landfill ranged from about 700 to 2,300 ft/sec. The wide velocity range for this layer is apparently due to the variation of the fill material. Velocity inversion across the center of the landfill, and the presence of a near surface layer with a seismic velocity of 2,000 to 3,000 ft/sec are considered anomalies. A possible interpretation of these conditions is that the water table is significantly displaced. Water level observations indicate that this is probably the condition across a portion of the landfill. The anomaly of the seismic inversion may have resulted from localized cementing of the overburden material. Subsurface drilling and test pit excavations suggest this inversion is caused by sludgy or tarry material deposited in the landfill, which may have permeated the natural soils (SMC Martin).

A magnetometric survey conducted in the landfill area located several zones of anomalous magnetic conditions. The magnetic anomalies coincided well with areas where waste drums were exposed at the surface, and indicated locations where other drums may have been buried. Text pit excavations performed at several of these magnetic anomaly locations uncovered buried metallic debris and drums.

Fill in the landfill is highly variable and encountered at varying depths down to about 20 feet (see Figure 6). This fill is generically described as "variable petrochemical waste material intermixed with soil," including oil, tars, sludges, and hazardous waste-containing drums. While the chemical nature of the waste material has not been estimated in the field descriptions of the material, it is estimated from visual observation that the fill material in the landfill is about 50 percent soil and 50 percent waste material (SMC Martin).


LEGEND
- PHASE II MONITORING WELL
- PHASE I MONITORING WELL
- PHASE II AUGER BORING
- PHASE I AUGER BORING
- NO WASTE PRESENT
—10—ISOPACH, WASTE THICKNESS, FT.
GENESEE RIVER
CENTRAL ELEVATED LANDFILL AREA (CELA)
SOUTH LANDFILL AREA (SLA)
BORROW AREA
IMPOUNDMENT
DIKE
WEIDRICK RD.
SOUTH BROOKLYN AVENUE
ABANDONED RAILROAD RIGHT-OF-WAY
DAM
Prepared for:
NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
50 WOLF ROAD ALBANY NEW YORK
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NORMAN H. NOSENCHUCK, P.E.
DIRECTOR
Approved
DATE
SCALE
SINCLAIR LANDFILL SITE
WELLSVILLE NEW YORK
FEASIBILITY STUDY
WASTE THICKNESS & AREAL EXTENT MAP
Prepared By
VALLEY FORGE PA 19482

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Figure 6

Site History

The site, originally developed as an oil refinery during the late 1800s, was operated by the Wellsville Refining Company. Products manufactured by refinement of Pennsylvania "sweet" (low sulfur content) crude oil included lubricating oils and grease, fuel oil, naptha, gasoline, lighter fluid, and paraffin. In 1924, the Wellsville Refining Company sold the property and plant to the Sinclair Refining Company which maintained and operated the refinery until 1958, when operations ceased as a result of a fire. Following the fire, Sinclair transferred the bulk of the property to the Village of Wellsville, reserving to itself some portions of real property and improvements, materials and other assets on the property, which were separately disposed of by contract with the New York Refinery Project. The Village of Wellsville subsequently disposed of its parcels to various interests after the transfer. An agricultural and technical college and an industrial park have since been developed by the dispensing of some of the parcels. All of the oil tanks from the refinery operation and a number of the original buildings have been removed. Several structures have been renovated; several remain vacant.

While the refinery was in operation, the southernmost portion of the property was used as a landfill. The landfill, located along the Genesee River, was used to dispose of approximately 230,000 yd^3 of wastes (see Table 1) during its 60 years of use. It has been estimated that 206,500 yd^3 of this waste was disposed of in the CELA; the remaining volume being disposed of in the SLA.

The working face of the landfill was accessed by roads traversing the landfill, ending its southernmost extremity. These roads ended in areas where mounded material and debris were deposited.

An extensive fill mound in the central portion of the landfill is composed of soil-like material and unidentifiable debris. The center of this mound was hollowed out to form a lagoon, used to contain dark liquids. A channel to the east allowed lagoon overflow to be diverted to the Genesee River. Trenches and pits for burial of either solids or liquids were present in the northern portion of the landfill.

TYPES OF WASTES DEPOSITED IN THE SINCLAIR REFINERY LANDFILL

- Cloth filters used for straining oil from the contact plant
- Sludges from an oil separator emanating from the light oil and fuels plant (disposed of in a pond within the landfill site)
- Tank sludges from the solvent plant
- "Off-specification" products
- Sludge dumptruck loads of oil-soaked soil and sludges (daily)
- Fullers Earth (used for filtering) burned and then disposed
- Approximately 500 gallons of tank sludges (weekly)
- Acid spills (disposed of in pond within the landfill site)
- Cinders and ash from the coal-fired boiler plant
- Tetraethyl lead
- Pesticides
- Waste oil
- Heavy metals

Table 1

By 1958, when the refinery terminated its operations, the lagoon consisted of only a small pool of standing liquid in the center, surrounded by the drier, dark stained surface of the basin. Portions of the northern and eastern edges of the lagoon, trenches and pits were filled in.

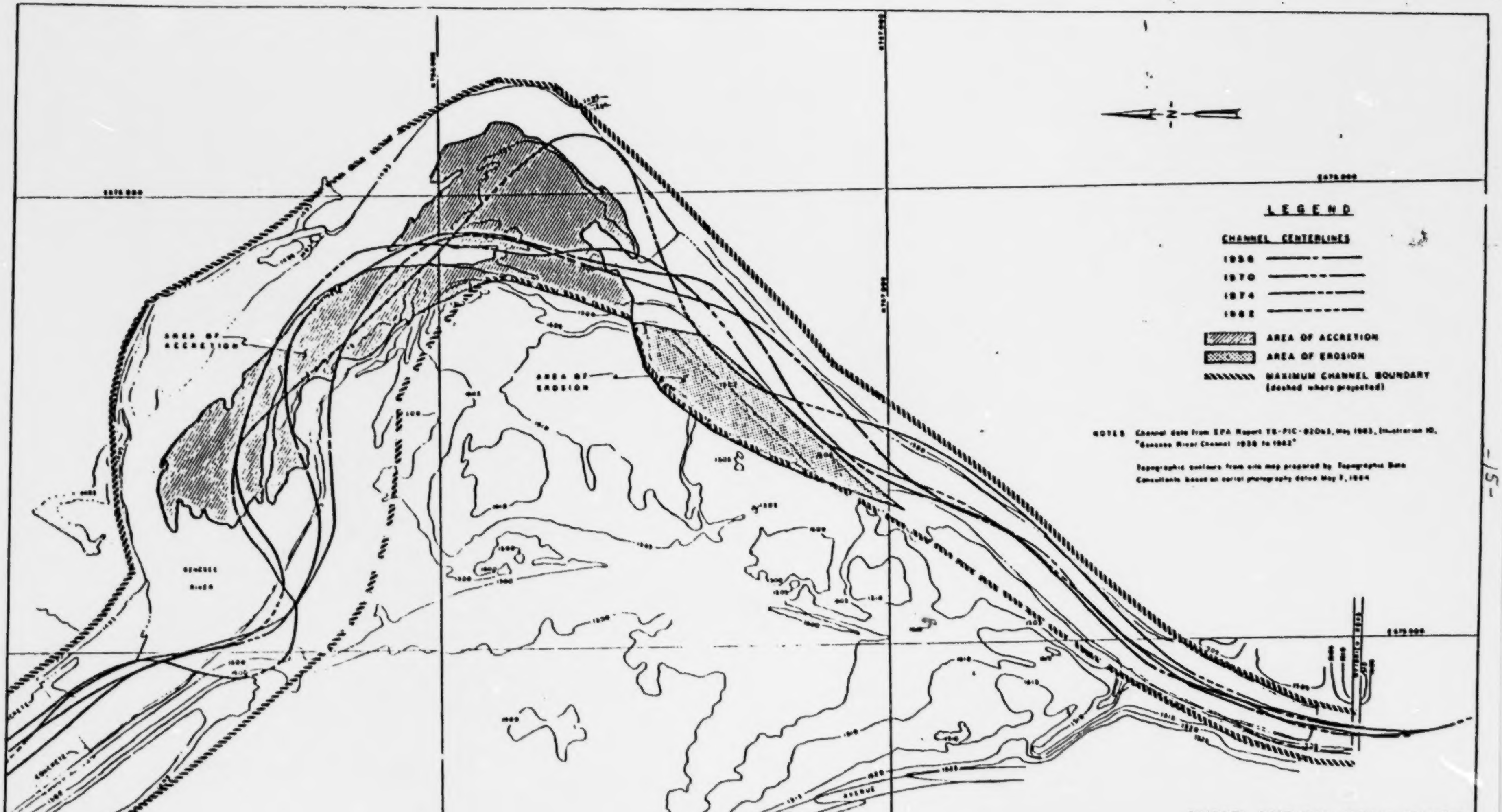
Activities on the landfill continued long after the closure of refinery operations. Evidence from 1964, 1970, 1974, and 1982 aerial photographs indicate that lagoon dredging, trench back-filling, additional landfilling, and general regrading occurred throughout this period. Additional landfilling appears to be most extensive in the 2.3-acre SLA between the years 1970 and 1974. By 1982, the landfill had been graded almost flat, and a surficial covering of clay or silt covered portions of it. At that time, the lagoon had been largely filled, a linear area of dark standing liquid in the center of the landfill being the only remnant of the lagoon.

Damaging Genesee River floods have occurred in the Village of Wellsville five times since 1913. The most recent flood, caused by Tropical Storm Agnes in 1972, damaged and destroyed bridges crossing the Genesee River in the Village and caused over $12 million damage, overall.

From 1973 to 1976, the U.S. Army Corps of Engineers (COE) undertook a flood control project in the Village, constructing levees along both banks of the Genesee River through the Village to a point immediately north of the CELA. This flood control work was intended to rectify deficiencies in initial flood protection work undertaken in the 1950s.

As can be seen by Figure 7, the Genesee River has had a history of systemically meandering in the vicinity of the landfill, shifting as much as several hundred feet in some places from 1958-1982. As the meanders migrated further downstream, the increasing meandor amplitude resulted in increased river bank erosion.

The Genesee River began eroding a portion of the landfill as a result of this lateral movement of the river-bed and heavy rains in October 1981. Analytical results from the site indicated the presence of PCBs, arsenic, mercury, and lead. In association with the period of high water in the river, organic taste and odor problems were observed with the drinking water. Test results from the Village of Wellsville's water treatment plant, the intake of which is located approximately 1 mile downstream of the landfill, indicated low levels of aliphatic hydrocarbons (10 ug/1 as carbon; EPA's limit is 1000 ug/1 as carbon).


N
LEGEND
CHANNEL CENTERLINES
1958
1970
1974
1982
▨ AREA OF ACCRETION
▨ AREA OF EROSION
MAXIMUM CHANNEL BOUNDARY (dashed where projected)
AREA OF ACCRETION
AREA OF EROSION
GENESEE RIVER
SOUTH BROOKLYN AVENUE

NOTES Channel data from EPA Report TS-PIC-82063, May 1983, Illustration 10, "Genesee River Channel 1938 to 1982"

Topographic contours from site map prepared by Topographic Data Consultants based on aerial photography dated May 7, 1984

CHANNEL FEATURES: 1958 to PRESENT

Prepared For:
NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
50 WOLF ROAD, ALBANY NEW YORK
HENRY G WILLIAMS, COMMISSIONER

DIVISION OF SOLID AND HAZARDOUS WASTE
NORMAN H NOSENCHUCK, PE
DIRECTOR

SCALE [illegible]

SINCLAIR LANDFILL SITE
WELLSVILLE NEW YORK

FEASIBILITY STUDY

COMPOSITE
GENESEE RIVER CHANNEL

Figure 7

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Following the landfill bank erosion and citizen water taste and odor complaints, the Allegany County Health Department and New York State Department of Transportation investigated the site in conjunction with an investigation by the New York State Department of Environmental Conservation (NYSDEC), in the fall of 1981. In June 1982, the EPA Field Investigation Team visited the site and collected samples.

A Technical Assistance Team investigation performed in October 1982 resulted in the Region's request for an immediate removal action to stabilize the eroding bank of the landfill. Funding for this action was denied by the Assistant Administrator for Solid Waste and Emergency Response in January 1983. At that time, the potentially responsible party indicated a willingness to remove drums from the Genesee River that had washed from the eroding landfill, and to stabilize the bank. Although in January 1983, the PRP removed approximately 10 drums from the river, it changed its positon regarding stabilizing the eroding landfill. To prevent the imminent threat of further erosion of the landfill during potential high water conditions that Spring, in March 1983, the State used its own funds to construct a temporary diversion of the Genesee River by excavating a channel that could accommodate a two-year frequency flood.

In July 1983, EPA and NYSDEC entered into a a Cooperative Agreement to undertake a Remedial Investigation (RI) and Feasibility Study (FS) at the Sinclair Refinery site. SMC Martin was selected by NYSDEC to perform the required work.

The RI was broken into two phases. Phase I was performed to provide a detailed characterization of the landfill portion of the site and reconnaissance assessment of the refinery portion of the site. The ongoing Phase II RI provided additional data on the landfill portion of the site, and will provide a more focused investigation of those areas on the refinery portion of the site where additional data requirements were identified. Originally, only an FS for the landfill portion of the site was covered by the Cooperative Agreement. Because of the petroleum exclusion provision contained in CERCLA, the FS for the 90-acre refinery portion of the site could not be performed unless "hazardous substances" were found on this segment of the site. Since hazardous substances were detected at the refinery portion of the site during the Phase I RI, upon completion of the Phase II RI, an FS will be conducted at the refinery portion of the site.

In an action funded by the Potentially Responsible Party in November 1983, the height of the dike constructed in March 1983 was raised and it was strengthened with rip-rap.

In December 1983, partial fencing was constructed to limit access to the landfill from the roadway.

In March 1985, the Cooperative Agreement was amended to perform the Phase II RI and an FS for the refinery portion of the site.

In May 1985, based upon the data collected at the Village's Water Treatment Plant as part of the RI, and in response to concerns regarding the threat to the water supply from the Sinclair Refinery site, SMC Martin completed a focused FS evaluating initial remedial measures to protect the Wellsville Water Treatment Plant. The recommended measure involves relocating the water supply's intake to a point upstream of the site (see "Authorization to Proceed with an Initial Remedial Measure at the Sinclair Refinery Site, Wellsville, NY - Action Memorandum" for specific details).

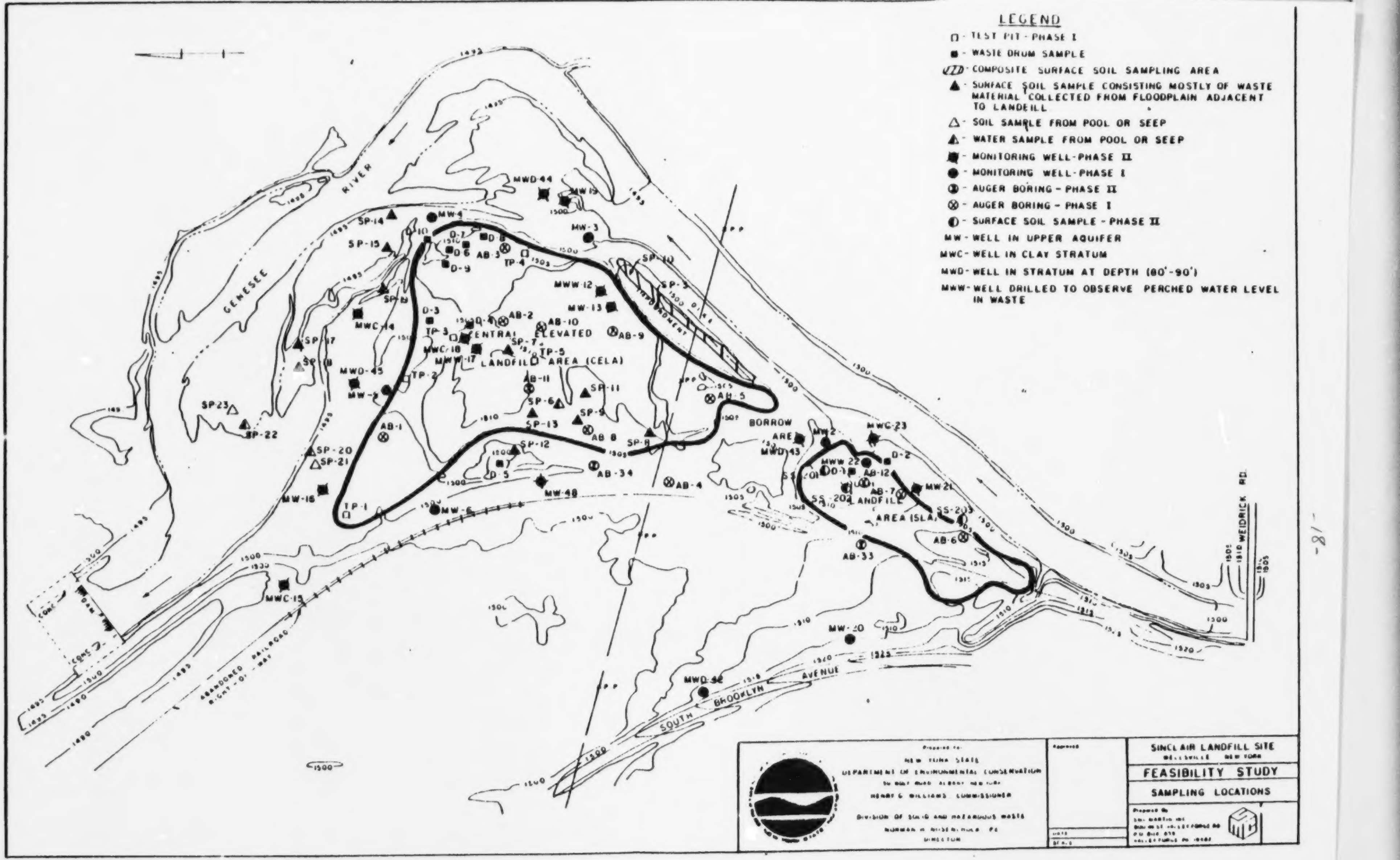
In August 1985, SMC Martin completed a draft FS for the landfill portion of the site.

Current Site Status

There are seven potential routes of exposure associated with the landfill portion of the Sinclair Refinery site, including subsurface and surface soil, surfical drums, pools and surface water, river sediments, and flora and fauna. Figure 8 indicates the sampling locations for all media from the Phase I and II RIs.

•Soil

As can be seen from Tables 2 and 3, the landfill soil samples, as well as soil samples from the bottom of shallow pools adjacent to the Genesee River, exhibit high levels of base neutrals and volatile organics, most notably 10,000,000 ppb docosane, 1,400,000 ppb 1,3,5 trimethylbenzene, and 870,000 ppb heptadecane. Metals are also present, but at considerably lower concentrations. The most noteworthy concentrations are 1670 ppm lead and 1020 ppm copper.


LEGEND
□ - TEST PIT - PHASE I
■ - WASTE DRUM SAMPLE
▨ - COMPOSITE SURFACE SOIL SAMPLING AREA
▲ - SURFACE SOIL SAMPLE CONSISTING MOSTLY OF WASTE MATERIAL COLLECTED FROM FLOODPLAIN ADJACENT TO LANDFILL
△ - SOIL SAMPLE FROM POOL OR SEEP
▲ - WATER SAMPLE FROM POOL OR SEEP
■ - MONITORING WELL - PHASE II
● - MONITORING WELL - PHASE I
⊕ - AUGER BORING - PHASE II
⊗ - AUGER BORING - PHASE I
◐ - SURFACE SOIL SAMPLE - PHASE II
MW - WELL IN UPPER AQUIFER
MWC - WELL IN CLAY STRATUM
MWD - WELL IN STRATUM AT DEPTH (80'-90')
MWW - WELL DRILLED TO OBSERVE PERCHED WATER LEVEL IN WASTE
GENESEE RIVER
CENTRAL ELEVATED LANDFILL AREA (CELA)
BORROW AREA
LANDFILL AREA (SLA)
EMBANKMENT
SOUTH BROOKLYN AVENUE
WEIDRICK RD.
ABANDONED RAILROAD RIGHT-OF-WAY
MW-4
MW-3
MW-19
MWD-44
SP-14
SP-15
SP-16
SP-17
SP-18
SP23
SP-22
SP-20
SP-21
MWC-14
MWD-45
MW-2
AB-1
TP-1
MW-16
MWC-15
D-7
D-8
D-6
D-9
AB-3
TP-4
D-3
TP-3
MWC-18
MWW-17
TP-2
AB-2
AB-10
TP-5
SP-7
MWW-12
MW-13
AB-9
SP-10
SP-5
AB-11
SP-11
SP-6
SP-13
SP-9
AB-8
SP-8
SP-12
D-5
MW-48
AB-34
MW-6
AB-5
AB-4
MW-2
MWD-43
MWC-23
MWW-22
D-1
D-2
AB-12
AB-7
MW-21
SS-201
SS-202
SS-203
AB-6
AB-33
MW-20
MWD-32
Prepared for:
NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
50 WOLF ROAD ALBANY NEW YORK
HENRY G. WILLIAMS COMMISSIONER
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Date
Scale
SINCLAIR LANDFILL SITE
WELLSVILLE NEW YORK
FEASIBILITY STUDY
SAMPLING LOCATIONS
Prepared By

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Figure 8

RANGE OF CONCENTRATIONS
PRIORITY POLLUTANT COMPOUNDS
SUBSURFACE SOIL SAMPLES

Number of Samples:	Auger Boring-Landfill Area 12	Test Pits 12
VOLATILE ORGANICS (ppb)		
benzene	ND-<8800	ND-240(3)
bromodichloromethane	ND	ND-<2.2
chloroform	ND	ND-<1.6
ethylbenzene	ND-180000(2)	ND-5400(4)
methylene chloride	ND-72(2)	ND-1900(11)
1,1,2,2-tetrachloroethane	ND	ND-150(1)
tetrachloroethylene	ND-33000(1)	ND
toluene	ND-72000(2)	ND-130(3)
BASIC/NEUTRAL EXTRACTABLES (ppm)		
acenophthehe	ND	ND-<1
anthracene	ND	ND-<1
benzo(a)anthracene	ND	ND-4.5(2)
benzo(b)fluoranthene	ND	ND-<1
benzo(a)pyrene	ND	ND-<1
fluoranthene	ND	ND-5.7(2)
fluorene	ND	ND-<60
naphthalene	ND-21(1)	ND-79(5)
phenanthrene	ND-1.80(1)	ND-8(2)
pyrene	ND-<38	ND-<1
ACID EXTRACTABLES (ppm)		
2,4-dimethylphenol	ND	ND-20(1)
phenol	ND	ND-<1
CYANIDES & PHENOLICS (ppm)		
Total cyanide	ND-0.76(2)	ND-0.85(2)
Total recoverable phenolics	ND-4.40(6)	ND-140(8)

Number of Samples:	Auger Boring-Landfill Area 12	Test Pits 12
METALS (ppm)		
antimony	ND	ND
arsenic	17-51(12)	4.2-70.8(12)
beryllium	ND	ND-2.6(3)
cadmium	ND-0.57(3)	ND-1.1(1)
chromium	13-49(12)	7.6-69.8(12)
copper	7.7-90(12)	5.0-1020(12)
lead	1-1240(12)	2.6-385(12)
mercury	ND-2(6)	ND-0.36(2)
nickel	2.7-328(12)	4.9-26.9(12)
selenium	ND-0.22(3)	ND-2.3(3)
silver	ND-8.1(4)	ND
thallium	ND	ND-5.7(2)
zinc	36-521(12)	35.5-101(12)
PESTICIDES (ppm)		
aldrin	ND	ND
α-BHC	ND-0.20(2)	ND
β-BHC	ND	ND
4,4'-DDD	ND	ND
4,4'-DDE	ND-0.08(3)	ND
4,4'-DDT	ND-0.03(3)	ND
α-endosulfan	ND-0.19(5)	ND
endosulfan sulfate	ND-0.04(2)	ND-0.11(2)
endrin	ND-0.07(3)	ND
endrin aldehyde	ND	ND
heptachlor	ND-0.03(2)	ND
heptachlor epoxide	ND-0.10(3)	ND
PCBs (ppm)		
PCB-1016	ND	ND
PCB-1221	ND	ND-<2
PCB-1232	ND	ND-<2
PCB-1242	ND	ND
PCB-1248	ND	ND
PCB-1254	ND	ND
PCB-1260	ND	ND

NOTE: Number in parentheses following the range of concentrations indicate the number of samples in which the compound was detected at quantifiable limits.

Table 2

NON-PRIORITY POLLUTANTS

Landfill

VOLATILE ORGANIC COMPOUNDS (ppb)	WASTE	SUBSURFACE SOIL
1,1,3-Trimethylbenzene	ND	ND
Cyclohexane	4,800	1,200
Methycyclohexane	10,000	15,000
4-Methyl-1-Pentanol	2,500	1,100
2-Methyl-1-Pentene	5,900	1,200
3,4,4-Trimethyl-4-Pentene	8,700	13,000
Methyl Ethyl Ketone (MEK)	110	78
1,2,3-Trimethylcyclohexane	ND	100
1-Ethyl-4-Methylcyclohexane	ND	250
1,1,3-Trimethylcyclohexane	ND	250
2,2,-Dimethyl-3-Hexene	ND	1,200
TOTAL XYLENES	50,000	42,000
BASE/NEUTRAL EXTRACTABLES (ppb)		
Docosane	110,000	10,000,000
Eicosane	13,000	350,000
Heptadecane	120,000	99,000
Hexadecane	78,000	110,000
4-Methylbenzaldhyde	11,000	ND
Octadecane	79,000	200,000
Pentadecane	60,000	120,000
1,3,5-Trimethylbenzene	1,400,000	820,000
4-Methyl-4-Hydroxyl-2-Pentanone	ND	110,000

ND - Not Detected
<2.5 - Detected but below quantifiable limit (number following "<")

Table 2
Continued

RANGE OF CONCENTRATIONS
PRIORITY POLLUTANT COMPOUNDS
SURFACE SOIL SAMPLES

Number of Samples:	Adjacent Area to Landfill Seeps, Pool and Floodplain 7	Landfill - Seeps and Pools 6	Background Surface Samples 3
VOLATILE ORGANICS (ppb)			
benzene	ND	ND	ND
chloroform	ND	ND-65(1)	ND
1,2-dichloropropene	ND	ND	ND
1,3-dichloropropene	ND	ND	ND
ethylbenzene	ND	ND-600(2)	ND
methylene chloride	ND-300(1)	ND-560(2)	ND
1,1,2,2-tetrachloroethane	ND	ND-190(1)	ND
tetrachloroethylene	ND	ND	ND
toluene	ND	ND-190(1)	ND
BASE/NEUTRAL EXTRACTABLES			
anthracene	ND	ND	ND
benzo(a)anthracene	ND-1.1(1)	ND	ND
benzo(b)fluoranthene	ND	ND	ND
benzo(a)pyrene	ND	ND	ND
1,2-dichlorobenzene	ND	ND	ND
1,3-dichlorobenzene	ND	ND	ND
1,4-dichlorobenzene	ND	ND	ND
fluoranthane	ND-<1	ND-110(4)	ND
fluorene	ND	ND-53(4)	ND
naphthelene	ND	ND	ND
phenanthrene	ND-<1	ND	ND
pyrene	ND-<1	ND-350(4)	ND
ACID EXTRACTABLES (ppm)			
phenols	ND	ND	ND
CYANIDES AND PHENOLICS (ppm)			
Total cyanide	<1-1.7(5)	ND-1.3(2)	ND-0.61(2)
Total recoverable phenolics	<1-3.6(6)	0.97-7.80(6)	ND
METALS (ppm)			
antimony	ND	ND	ND
arsenic	11-31(7)	24-74(6)	7.9-19(3)
beryllium	ND	ND-0.62(1)	ND
cadmium	ND	ND	ND
chromium	5.6-60(7)	19-61(6)	7.5-14(3)
copper	8.6-19(7)	16-226(6)	7.2-12(3)
lead	4.7-43(7)	109-1670(6)	1.3-29(3)
mercury	ND-0.16(2)	0.2-2.4(6)	ND
nickel	7.9-35(7)	8.4-17(6)	22-33(3)
selenium	ND	ND	ND
silver	ND	ND	ND
thallium	ND	ND	ND-0.41(1)
zinc	43-115(7)	78-181(6)	33-67(3)
PESTICIDES (ppm)			
aldrin	ND-3(2)	ND	ND
α-BHC	ND-5.6(5)	ND	ND
β-BHC	ND-<5	ND	ND
δ-BHC	ND-<5	ND	ND
γ-BHC	ND-0.19(1)	ND	ND
chlorodane	ND-<20	ND	ND
4,4'-DDD	ND-8.4(2)	ND	ND
4,4'-DDE	ND-11(3)	ND-0.05(1)	ND
4,4'-DDT	ND-11(4)	ND-0.02(1)	ND
dieldrin	ND-1.9(1)	ND	ND
α-endosulfan	ND-17(5)	ND-0.05(2)	ND
β-endosulfan	ND-<5	ND	ND
endosulfan sulfate	ND-13(2)	ND	ND
endrin	ND-14(2)	ND	ND
endrin aldehyde	ND-3(2)	ND	ND
heptachlor	ND-<5	ND	ND
heptachlor epoxide	ND-8.4(2)	ND-0.02(1)	ND
toxaphene	ND-<20	ND	ND
PCBs (ppm)			
PCB-1016	ND	ND	ND
PCB-1221	ND	ND	ND
PCB-1232	ND	ND	ND
PCB-1242	ND	ND	ND
PCB-1248	ND	ND	ND
PCB-1254	ND	ND	ND
PCB-1260	ND	ND	ND

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NOTE: Number in parentheses following the range of concentrations indicate the number of samples in which the compound was detected at quantifiable limits.

Table 3

NON-PRIORITY POLLUTANTS

Landfill

VOLATILE ORGANIC COMPOUNDS (ppb)	SURFACE SOIL
1,1,3-Trimethylbenzene	ND
Cyclohexane	14,000
Methycyclohexane	34,000
4-Methyl-1-Pentanol	4,900
2-Methyl-1-Pentene	23,000
3,4,4-Trimethyl-4-Pentene	2,300
Methyl Ethyl Ketone (MEK)	ND
1,2,3-Trimethylcyclohexane	ND
1-Ethyl-4-Methylcyclohexane	ND
1,1,3-Trimethylcyclohexane	ND
2,2,-Dimethyl-3-Hexene	ND
TOTAL XYLENES	3,600

BASE/NEUTRAL EXTRACTABLES (ppb)	
Docosane	90,000
Eicosane	83,000
Heptadecane	870,000
Hexadecane	370,000
4-Methylbenzaldhyde	ND
Octadecane	740,000
Pentadecane	170,000
1,3,5-Trimethylbenzene	81,000
4-Methyl-4-Hydroxyl-2-Pentanone	34,000

ND - Not Detected
<2.5 - Detected but below quantifiable limit (number following "<")

Table 3

Continued

•Ground water

Based upon an interpretation of ground-water elevations in the CELA, it appears that most of the landfilled waste might be above the water table, though it is probable that the waste itself has displaced the water table. This is attributable to a relatively impermeable sludge layer at the base of the waste. As a result, the waste is not water-saturated and does not generate excessive amounts of leachate. At the SLA, a sludgy barrier layer does not exist as in the case of the CELA. As a result, the waste is considerably closer to the ground water at the SLA, as compared to the CELA.

Infiltration rates were observed to be highest in the SLA at average rates of 0.223 in/hr (falling head conditions) and 1.06 in/hr (constant head conditions). Significantly lower infiltration capacities were observed in the CELA, with average infiltration rates of 0.26 in/hr (falling head conditions) and 0.17 in/hr (constant head conditions), suggesting a relatively impermeable landfill cover. As a result, rather than percolating through the waste to yield contaminated ground water, most of the rainwater falling on top of the CELA travels over the surface of the landfill either pooling in depressions atop the landfill or infiltrating the surface elsewhere. Given the low infiltration capacities and the relatively impermeable nature of the CELA cover, it seems likely that pooled water in these depressions more likely evaporates than infiltrates the surface. Because of the low permeability of the CELA, significnt levels of contamination were not found in the ground water. In the SLA, because of the higher permeability of the cover material and the buried wastes, as compared to the CELA, more precipitation passes through the landfill, however, overall leachate generation associated with the landfill appears to be low, as well. Table 4 summarizes the range of contaminants found in the ground water. The most notable concentrations found include 23,000 ppb 4-methy-4-hydroxyl-2-pentanone, 6,000 ppb bis (2-ethyl hexyl) phthalate, and 3,000 ppb fluorene beneath the Landfill site. Insignificant levels of contamination were found in landfill perimeter wells.

GROUND WATER SAMPLES

VOLATILE ORGANIC COMPOUNDS (ppb)	
1,1,1-Trichloroethane	17
Benzene	4.5
Chlorobenzene	12
1,3-Dichloropropene	<2.5
1,1,2,2-Tetrachloroethane	12
Ethylbenzene	<3.6
Toluene	5.0
Vinyl Chloride	<5.0
Bromodichloromethane	ND
Chloroform	ND
Methylene Chloride	ND
Benzo(A)Anthracene	ND
Tetrachloroethylene	ND
Pyrene	ND
Phenanthrene	ND
1,1,3-Trimethylbenzene	25
Cyclohexane	19
Methycyclohexane	79
4-Methyl-1-Pentanol	<5
2-Methyl-1-Pentene	8.5
3,4,4-Trimethyl-4-Pentene	33.5
Methyl Ethyl Ketone (MEK)	ND
1,2,3-Trimethylcyclohexane	ND
1-Ethyl-4-Methylcyclohexane	ND
1,1,3-Trimethylcyclohexane	ND
2,2,-Dimethyl-3-Hexene	ND
TOTAL XYLENES	<10

BASE/NEUTRAL EXTRACTABLES (ppb)	
Bis(2-Ethyl Hexyl) phthalate	6,000
Flouranthene	2.3
Flourene	3,000
Napthalene	ND
Phenanthrene	10
Pyrene	ND
Acenaphthene	ND
Arthacene	ND
Benzo(A) Anthracene	ND
Benzo (A) Pyrene	ND
Benzo (B) Flourathene	ND
Di-N-Octylphthalate	1,000
2-Methylnaphthalene	28
Docosane	<2.5
Eicosane	9
Heptadecane	27.8
Hexadecane	<2.5
4-Methylbenzaldhyde	ND
Octadecane	15.1
Pentadecane	16
1,3,5-Trimethylbenzene	2.5
4-Methyl-4-Hydroxyl-2-Pentanone	23,000

METALS (ppm)	
Total Arsenic	12
Total Beryllium	<.005
Total Cadmium	ND
Total Chromium	<.005
Total Copper	.013
Total Lead	5
Total Mercury	ND
Total Nickel	320
Total Selenium	ND
Total Thallium	ND
Total Zinc	2,640
Total Silver	.020

PESTICIDES (ppm)	
4,4'-DDD	ND
4,4'-DDE	ND
4,4'-DDT	ND
Dieldrin	ND
a-Endosulfan	ND
Endosulfansulfate	ND
Endrin	ND
Endrin Alehyde	ND
Heptachlor Expoxide	ND
Aldrin	ND
a-BHC	ND
-BHC	ND
Heptachlor	ND

PCBs (ppm)	
PCB-1221	ND
PCB-1232	ND
PCB-1016	ND
PCB-1242	ND
PCB-1248	ND
PCB-1254	ND
PCB-1260	ND

CYANIDES & PHENOLICS (ppm)	
Total Cyanide	<.010
Total Recoverable Phenolics	.016

ND - Not Detected
<2 - Detected but below quantifiable limit (number following "<")

Table 4

The "Hydrologic Evaluation of Landfill Performance" (HELP) computer program, a two-dimensional hydrologic model of water movement across, into, through, and out of landfills, provided a rough approximation of the leachate which may be generated at the Landfill site under average conditions. The model predicted that for conditions present in the CELA, less than one percent of the annual precipitation (50 gallons per day (gpd)), will leach through the waste and upper aquifer, and through the clay substratum, with virtually none leaching through the waste and laterally draining from the aquifer into the Genesee River. Eighty-nine percent of the annual precipitation will be consumed as evapotranspiration and runoff, with the remaining 10 percent accumulating in the CELA soil/waste matrix. For the SLA, the HELP model predicted that roughly 2 percent (100 gpd) of the annual precipitation will percolate from the surface, through the waste and upper aquifer, and through the clay substratum. Roughly 66 percent of the annual precipitation will be lost to evapotranspiration and runoff. Thirty-one percent will laterally drain to the Genesee River via the upper aquifer, with very little being stored in the SLA.

As predicted by the HELP model and confirmed by the failure to find contamination in perimeter wells and wells in the clay beneath the landfill, overall leachate generation appears to be extremely low at this time.

•Drums

Buried drums may also be potential sources of ground-water contamination at the Landfill site. A variety of hazardous waste compounds, including metals and volatile organics, were observed in samples from exposed drums on the landfill surface. Table 5 describes the condition and contents of sampled drums. Table 6, summarizing the levels of contamination found, shows 5,700 ppb methylene chloride, 7,300 ppb nitrobenzene, 31,500 ppb chromium, and 35,900 ppb zinc.

•Pools

Elevated levels of lead and arsenic in the pools atop the landfill and in the main drainage swale (see Table 7) suggest that surface water runoff may transport the metals to these local depressions and possibly to the Genesee River. A significant rise in river stage or a severe storm event would conceivably transport such pooled contaminants into the Genesee River.

DRUM WASTE SAMPLE DESCRIPTIONS AND DRUM CONDITION NOTES

Drum	Description/Notes
D-1	Drum is completely crushed and about 50% exposed at the surface. The area appears to be regraded. The drum material appears to be intermixed soil and orange, black and gray waste. The orange discoloration may be from rusting. The waste appears to be weathered.
D-2	Drum is completely crushed and exposed at the surface. The waste material consisted of black solids, gray fibrous solids, and discolored soil like material.
D-3	Drum is partially exposed at the surface, completely rusted and somewhat crushed. Both ends of the drum are open. The material inside the drum is dark brown in color with a waxy texture. The material is homogeneous in both texture and color.
D-4	Drum is 60% exposed at the surface, rusted and ruptured on both ends. The material inside consists of two phases; the first phase is a discolored soil-like material while the second is light brown in color with a waxy texture.
D-5	Drum is 60% exposed at the surface, rusted and open on one end. The dominant material inside is brown in color with a soil-like texture. A large cloth rag covered with a bright red resin material is also in the drum.
D-6	Drum is lying on surface and intact except for a small six-inch diameter hole in one side. The material inside consists of a homogeneous black crystalline solid.
D-7	Drum is piled among other drums and is 50% rusted through. Material inside is hard and white in color with a fluffy porous texture.
D-8	The bucket is 50% exposed to the surface with the open end facing up. Material in bucket is hard and homogeneous with a gray graphite like color.
D-9	Drum is 60% exposed on surface and partially crushed with one end open. Material is grayish-white in color with a dry, fluffy powder-like texture. Material contains many small septum like plugs.
D-10	Drum is lying on surface, rusted throughout and ruptured. Material inside is blackish brown in color with a crystalline solid texture similar to that found in D-6, perhaps in a different state of weathering.

Table 5

RANGE OF CONCENTRATIONS
PRIORITY POLLUTANT COMPOUNDS
DRUM WASTE SAMPLES

Number of Samples:	Drum Waste Samples 10
VOLATILE ORGANICS (ppb)	
benzene	ND
chlorobenzene	ND
chloroform	ND
1,1-dichloroethane	ND
1,2-dichloroethane	ND
1,1-dichloroethylene	ND
trans-1,2,dichloroethylene	ND
1,3-dichloropropene	ND
ethylbenzene	ND
methylene chloride	ND-5700(8)
1,1,2,2,-tetrachloroethane	ND
tetrachloroethylene	ND
toluene	ND
1,1,1-trichoroethane	ND
1,1,2-trichloroethane	ND
trichloroethylene	ND-2300(2)
vinyl chloride	ND
BASE NEUTRAL EXTRACTABLES (ppb)	
benzo(a)anthracene	ND-2.4(1)
di-n-butylphthalate	ND-1100(1)
dimethylphthalate	ND-6.1(3)
1,2-diphenyl hydrazene	ND-<750
fluoranthene	ND
fluorene	ND-<57
hexachlorobutadiene	ND-<1
naphthalene	ND-<1
nitrobenzene	ND-7300(1)
phenanthrene	ND-2.2(1)
pyrene	ND-1.0(1)
ACID EXTRACTABLES (ppb)	
2,4-dimethylphenol	ND
phenol	ND-16(1)
CYANIDES & PHENOLICS (ppb)	
Total cyanide	ND-0.83(4)
Total recoverable phenolics	ND-4.4(4)

Number of Samples:	Drum Waste Samples 10
METALS (ppb)	
antimony	ND
arsenic	ND-64(ppm)(9)
beryllium	ND-1.6(3)
cadmium	ND-1.9(2)
chromium	ND-31500(9)
copper	8.5-439(10)
lead	7.2-1600(10)
mercury	ND-3.9(4)
nickel	3.4-350(10)
selenium	ND-1.1(2)
silver	ND
thallium	ND
zinc	7-35900(10)
PESTICIDES (ppm)	
aldrin	ND
α-BHC	ND-0.04(2)
β-BHC	ND-0.01(1)
δ-BHC	ND-0.92(3)
γ-BHC	ND-0.04(1)
chlorodane	ND
4,4'-DDD	ND-0.65(3)
4,4'-DDE	ND-2.2(5)
4,4'-DDT	ND-7.0(5)
dieldrin	ND-0.2(1)
α-endosulfan	ND-0.84(3)
β-endosulfan	ND
endosulfan sulfate	ND-3.7(2)
endrin	ND-1.4(3)
endrin aldehyde	ND-0.66(2)
heptachlor	ND-0.27(2)
heptachlor epoxide	ND-0.01(1)
toxaphene	ND-<2
PCBs	
PCB-1016	ND-<2
PCB-1221	ND-<4
PCB-1232	ND-<4
PCB-1242	ND-<2
PCB-1248	ND-<2
PCB-1254	ND-<2
PCB-1260	ND-<2

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NOTE: Number in parentheses following the range of concentrations indicate the number of samples in which the compound was detected at quantifiable limits.

Table 6

RANGE OF CONCENTRATIONS
PRIORITY POLLUTANT COMPOUNDS
SURFACE WATER SAMPLES

	Landfill Area - Seeps and Pools
Number of Samples:	6
VOLATILE ORGANICS (ppb)	
benzene	ND-5.5(1)
bromomethane	ND
bromodichloromethane	ND
bromoform	ND
chlorobenzene	ND
chloroform	ND
dibromochlormethane	ND
trans-1,2-dichloroethane	ND
ethylbenzene	ND-<7.2
1,1,2,2-tetrachloroethane	ND-<6.9
trichloroethylene	ND
toluene	ND-(6)
BASE/NEUTRAL EXTRACTABLES (ppb)	
acenaphthene	ND
1,3-dichlorobenzene	ND
1,4-dichlorobenzene	ND
fluorene	ND
naphthalene	ND
nitrobenzene	ND
N-nitrosodimethylamine	ND
phenanthrene	ND
ACID EXTRACTABLES (ppb)	
2,4-dimethylphenol	ND
phenol	ND-9.5(1)
CYANIDES & PHENOLICS (ppb)	
Total cyanide	ND-<10
Total recoverable phenolics	<10-66(3)

	Landfill Area - Seeps and Pools
Number of Samples:	6
METALS (ppb)	
antimony	ND
arsenic	ND-26(5)
beryllium	ND
cadmium	ND-0.7(1)
chromium	ND-11(2)
copper	ND-38(4)
lead	ND-310(3)
mercury	ND-3(1)
nickel	ND-28(3)
selenium	ND
silver	ND-8(2)
thallium	ND
zinc	ND-73(5)
PESTICIDES (ppb)	
α-BHC	ND-0.87(2)
β-BHC	ND
δ-BHC	ND-0.20(2)
γ-BHC	ND
4,4'-DDD	ND-0.07(1)
4,4'-DDE	ND-0.16(2)
4,4'-DDT	ND
α-endosulfan	ND
endrin	ND-0.87(2)
endrin aldehyde	ND
heptachlor	ND
heptachlor epoxide	ND-0.02(1)
PCBs	
All compounds ND	

NOTE: Number in parentheses following the range of concentrations indicate the number of samples in which the compound was detected at quantifiable limits.

Table 7

NON-PRIORITY POLLUTANTS

Landfill

VOLATILE ORGANIC COMPOUNDS (ppb)	SURFACE WATER
1,1,3-Trimethylbenzene	ND
Cyclohexane	25
Methycyclohexane	37
4-Methyl-1-Pentanol	ND
2-Methyl-1-Pentene	28
3,4,4-Trimethyl-4-Pentene	ND
Methyl Ethyl Ketone (MEK)	ND
1,2,3-Trimethylcyclohexane	ND
1-Ethyl-4-Methylcyclohexane	ND
1,1,3-Trimethylcyclohexane	ND
2,2,-Dimethyl-3-Hexene	ND
TOTAL XYLENES	100
BASE/NEUTRAL EXTRACTABLES (ppb)	
Docosane	9.8
Eicosane	ND
Heptadecane	33
Hexadecane	19
4-Methylbenzaldhyde	ND
Octadecane	22
Pentadecane	7.1
1,3,5-Trimethylbenzene	15
4-Methyl-4-Hydroxyl-2-Pentanone	ND

ND - Not Detected
<2.5 - Detected but below quantifiable limit (number following "<")

Table 7
Continued

•Surface Water

As can be seen by Table 8, only low levels of contamination have been detected in the Genesee River. Table 9 shows that there does not appear to be significant levels of contamination in the Genesee River sediments. With the exception of low levels of non-priority pollutant base/neutral extractables, all of the average concentrations of detected pollutants found in the sediments are fairly consistent with the average background levels.

•Air

The only compound detected from the chemical analyses of air samples was methylene chloride at 3.6 mg/m^3 (see Table 10). Because this volatile organic compound is used widely in analytical laboratories, because it was the only compound reported, and because of the low levels detected, it is deemed insignificant in terms of characterizing air contamination at the site.

•Public Health Threat

The 1.2 million gallon per day Village of Wellsville Water Treatment Plant, the intake of which is located less than a mile downstream of the Sinclair Refinery site landfill, is the primary drinking water source for the 6,000 residents of the Village. The plant's existing facilities, while functional, are greatly in need of rehabilitation, and are not capable of completely removing the organic and inorganic compounds potentially discharging into the Genesee River from the Sinclair Refinery site.

Samples taken from the water treatment plant's finished water (see Table 11) through November 1984 have, on occasion, shown low levels of trihalomethanes, heavy metals, and base/neutral extractables, all within acceptable criteria levels. Phenol was also found on several occasions above the New York State Department of Health's (NYSDOH's) aesthetic guidelines. In December 1984, samples showed previously undetected compounds: 6.4 ppb benzene (above NYSDOH's 5 ppb chronic exposure criteria) and 4.8 ppb tetrachloroethylene (below NYSDOH's 50 ppb chronic exposure criteria).

RANGE OF CONCENTRATIONS
PRIORITY POLLUTANT COMPOUNDS
RIVER WATER SAMPLES

Number of Samples:	River Water High Flow 9	River Water Low Flow 13
VOLATILE ORGANICS (ppb)		
benzene	ND	ND
bromomethane	ND	ND
bromodichloromethane	ND	ND
bromoform	ND	ND
chlorobenzene	ND	ND-10(1)
chloroform	ND	ND
dibromochlormethane	ND	ND
trans-1,2-dichloroethane	ND-2.4(1)	ND-19(2)
ethylbenzene	ND	ND
1,1,2,2-tetrachloroethane	ND	ND
trichloroethylene	ND	ND-<1.9
toluene	ND	ND
BASE/NEUTRAL EXTRACTABLES (ppb)		
acenaphthene	ND	ND
1,3-dichlorobenzene	ND	ND-<1.9
1,4-dichlorobenzene	ND	ND
fluorene	ND	ND
naphthalene	ND	ND
nitrobenzene	ND	ND-8.3(4)
N-nitrosodimethylamine	ND	ND
phenanthrene	ND	ND
ACID EXTRACTABLES (ppb)		
2,4-dimethylphenol	ND	ND
phenol	ND	ND
CYANIDES & PHENOLICS (ppb)		
Total cyanide	ND	ND-13(1)
Total recoverable phenolics	ND-34(3)	ND

Number of Samples:	River Water High Flow 9	River Water Low Flow 13
METALS (ppb)		
antimony	ND	ND
arsenic	ND	ND-89(2)
beryllium	ND	ND
cadmium	ND-9(3)	ND
chromium	ND	ND
copper	ND-8(3)	ND
lead	ND	ND
mercury	ND-2(1)	ND-2.2(1)
nickel	ND-31(2)	ND-13(2)
selenium	ND	ND
silver	ND-9(2)	ND-6(1)
thallium	ND	ND
zinc	ND-22(5)	ND-26(2)
PESTICIDES (ppb)		
α-BHC	ND-0.02(1)	ND-0.20(11)
β-BHC	ND	ND-0.12(2)
δ-BHC	ND-0.02(2)	ND-0.03(3)
γ-BHC	ND	ND
4,4'-DDD	ND	ND
4,4'-DDE	ND	ND
4,4'-DDT	ND	ND
α-endosulfan	ND	ND
endrin	ND	ND
endrin aldehyde	ND-0.02(1)	ND-0.06(3)
heptachlor	ND-0.17(4)	ND-0.02(1)
heptachlor epoxide	ND	ND-0.03(3)
PCBs		
All compounds ND		

NOTE: Number in parentheses following the range of concentrations indicate the number of samples in which the compound was detected at quantifiable limits.

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Table 8

SEDIMENT SAMPLES COLLECTED FROM THE GENESEE RIVER

Number of Sample.	Genesee River Sediment 8
VOLATILE ORGANICS	
All compounds ND for samples.	
BASE/NEUTRAL EXTRACTABLES	
All compounds ND for samples.	
ACID EXTRACTABLES	
All compounds ND for samples.	
CYANIDES AND PHENOLICS (ppb)	
Total cyanide	0.62-2.6(7)
Total recoverable phenolics	ND-1.9(2)
METALS (ppb)	
Total antimony	ND-<2
Total arsenic	6.4-28(8)
Total beryllium	ND-<2(0)
Total cadmium	ND-1.2(1)
Total chromium	5.4-22(8)
Total copper	5.9-43(8)
Total lead	8.5-43(6)
Total mercury	ND-0.1(2)
Total nickel	0.90-12(8)
Total selenium	ND-<2
Total silver	ND-12(5)
Total thallium	ND-<2
Total zinc	21-166(8)
PESTICIDES (ppb)	
heptachlor	ND-1.3(1)
PCBs (ppb)	
PCB-1221	ND-<2
PCB-1232	ND-<2
NONPRIORITY VOLATILE ORGANICS	
All compounds ND for all samples.	
NONPRIORITY BASE/NEUTRAL EXTRACTABLES (ppb)	
docosane	ND- 2.8

Table 9

AIR SAMPLES

Air Sample Number:	AS-1		AS-2		AS-3		AS-4		AS-5	
Date of Collection	07/13/84		07/13/84		07/13/84		07/13/84		07/14/84	
Time of Collection	(0813-1215)		(0813-1215)		(1241-1641)		(1305-1720)		(0711-1111)	
	Front	Back	Front	Back	Front	Back	Front	Back	Front	Back
VOLATILE ORGANICS (mg/m^3)										
methylene chloride	3.6	0.27	0.41	0.29	0.17	BDL(.16)	0.33	0.21	1.3	1.8
NONPRIORITY VOLATILE ORGANICS										

Only methyl ethyl ketone and xylenes analyzed - all compounds ND for all samples.

Table 10

VILLAGE OF WELLSVILLE
WATER TREATMENT PLANT
SUMMARY OF POTABL WATER SAMPLING

	Raw Water 10/30/81	Finished Water 10/30/81	Raw Water 11/10/81	Finished Water 11/10/81	Raw Water 06/17/82	Raw Water 02/17/84	Raw Water 05/04/84	Finished Water 05/04/84	Raw Water 07/13/84	Finished Water 07/13/84	Finished Water 09/24/84	Finished Water 10/15/84	Finished Water 11/14/84	Finished Water 12/18/84	Finished Water 02/12/85
VOLATILE ORGANICS (ppb)															
benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.4	BDL(4.4)
bromodichloro-methane	ND	ND	ND	19	ND	ND	ND	11	ND	21	4.6	13	BDL(2.2)	ND	BDL(2.2)
bromoform	ND	ND	ND	ND	ND	ND	ND	BDL(4.7)	ND	ND	BDL(4.7)	BDL(4.7)	4.7	ND	BDL(4.7)
bromomethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	BDL(10)	ND	ND	ND	ND
chloroform	ND	ND	ND	19	ND	ND	ND	3.0	ND	24	1.7	4.0	ND	ND	ND
dibromochloro-methane	ND	ND	ND	18	ND	ND	ND	11	ND	11	9.2	11	4.5	ND	3.8
trans-1,2-dichlor-oethylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.8	BDL(1.6)	ND	ND	2.2
trichloro-ethylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	BDL(5.0)	ND
methylene chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	12	ND
tetrachloro-ethylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.8	ND
toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	BDL(6.0)	BDL(6.0)
BASE/NEUTRAL EXTRACTABLES (ppb)															
naphthalene	13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
nitrobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.1	4.0	4.7	ND	4.8
ACID EXTRACTABLES															
All compounds ND for all samples.															
CYANIDES AND PHENOLICS (ppb)															
Total recoverable phenolics	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10	ND	1.0	11
METALS (ppb)															
Total chromium	ND	ND	ND	ND	ND	ND	ND	6	ND	ND	9	ND	ND	ND	ND
Total copper	ND	ND	ND	ND	ND	ND	9	ND	13	7	23	7	ND	8	7
Total nickel	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6	ND	ND	ND
Total zinc	ND	ND	ND	ND	ND	ND	10	45	ND	56	37	28	ND	ND	29
PESTICIDES (ppb)															
δ-BHC	ND	ND	ND	ND	ND	ND	0.05	0.02	ND	ND	ND	ND	ND	ND	ND
PCBs															
All compounds ND for all samples.															
NONPRIORITY VOLATILE ORGANICS (ppb)															
cyclohexane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	BDL(10)	ND	ND	BDL(10)
o-xylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	BDL(10)	ND
NONPRIORITY BASE/NEUTRAL EXTRACTABLES															
All compounds ND for all samples.															

ND - Not detected
BDL( ) - Below detectable limit (detection limit) - Contaminant was identified but could not be quantified because its concentration was too low.

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Table 11

While the trihalomethanes found in the plant's finished water are likely to be the result of chlorination of natural organics in the raw water, and several of the heavy metals appear to be artifacts of the treatment system, the benzene, nitrobenzene, trans-1,2-dichlorethylene, and possibly the phenol, might be attributable to releases from the Sinclair Refinery site.

Although levels of contamination found in the water supply do not indicate gross contamination, because of the presence of hazardous substances in the landfill, possibly disposed of in an unsecure manner, and because a possible link between the site and the downstream water supply's low level of contamination might exist, it was determined that the implementation of an initial remedial protective measure to protect the public until the implementation of a long-term remedial measure, would be prudent. The initial remedial measure, although protecting public health, will not protect the environment from releases from the landfill.

°Biota Threat

Chemical analyses performed on species most likely to be consumed by humans, fish, have not indicated any potential threats. Biological screening has indicated potential bioaccumulation of at least two priority pollutant metals in tissue from other animals analyzed (see Table 12). The animal population in the landfill area, therefore, is considered a potential receptor by virtue of direct contact and/or ingestion of the hazardous waste constituents. Predators of these lower species should also be considered potential receptors, by virtue of the potential for bioconcentration.

Several bare spots exist on top of the landfill area where surface contamination has apparently prevented vegetative growth. A review of color infrared photographs of the entire site, however, do not reveal overall stressed vegetation as would be indicated by relative loss of infrared reflectance.

COMPARISON OF METAL CONCENTRATIONS IN ON-SITE AND OFF-SITE BIOLOGICAL TISSUE, SOIL, AND WATER

E - Meadow Voles - (Microtus pennsylvanicus)

	Station #6 A On-Site (Station #6)	 B Off-Site (Station #5)	 C A/B(%)	Station #7 A On-Site (Station #7)	 B Off-Site (Station #5)	 C A/B(%)
d (ppm)	.173	<0.1	173	.176	<0.1	176
enic (ppm)	<0.1	<0.1	100	<0.1	<0.1	100
kel (ppm)	.787	.466	169	.470	.466	100

ological Sample Stations #6 and #7 are in the landfill are (see Figure 3-13). In this area, rface soil concentrations of arsenic and nickel were about 300% over background levels. Lead ncentrations were about 500% over background levels.

- Bullfrog Tadpoles - (Rana catesbeiana)

Station #2 A On-Site (Station #2)	B Off-Site (Station #1)	C A/B(%)	D Surface Soil (SP-21)	E Background Soil (SP-17)	F D/E(%)	G Pooled Water (SP-20)	H Background Water (SW-17)	I G/H(%)
.100	.173	57	31	20	155	ND$^{(1)}$	ND	NC$^{(2)}$
.930	.885	103	31	19	163	ND	ND	NC
1.40	1.70	82	33	30	116	.12	ND	NC

= not detected.
= not calculated.

	Station #3 A On-Site (Station #3)	B Upstream (Station #1)	C A/B(%)	D Sediment (RS-13)	E Background River Sediment (RS-1)	F D/E(%)	G Pooled Water (SP-22)	H Background Water (SW-17)	I G/H(%)
	.374	.173	216	25	8.8	204	.27	ND$^{(1)}$	NC$^{(2)}$
m)	1.08	.885	132	17	13	131	.25	ND	NC
a)	3.11	1.70	183	2.5	9.9	25	.28	ND	NC

ND = not detected.
NC = not calculated.

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Table 12

•Overall Threat Potential

With substances deposited in the landfill consisting of drummed waste, oily and tarry sludges, and hazardous waste compounds in other forms, the landfilled areas of the site are potential sources of contamination. Although the landfill as a whole must be considered as a potential source of contamination by virtue of its contents, the landfill may be only a "passive" source of contamination in that it does not appear to be generating a substantial volume of leachate.

Although the subsurface and surface soils and waste are highly contaminated, ground-water analyses suggest these contaminants are not extremely mobile and are not migrating readily from the landfill area. Also, river water samples collected adjacent to the landfill do not reveal gross degradation of water quality.

Although a relatively "passive" contaminant source, the landfill as a whole must be considered a serious potential source of contamination by virtue of the hazardous substances deposited in the area. Buried drums in the landfill may be considered as potential point sources of contamination of the ground water, the Genesee River, and other media. Chemical analyses of the drums sampled for the Phase I RI reveal a variety of hazardous waste compounds, many of which are carcinogenic. Geophysical studies suggest that many more drums may be buried in the landfill. The condition and content of these buried or near-surface drums have not been ascertained.

Because the landfill area is partially fenced, direct human contact is restricted. The most significant threat from the landfill would be from flooding or failure of the landfill slopes. Failure of the landfill into the Genesee River would have a serious negative impact on public health and the environment.

Although gross contamination of the air medium has not occurred, the potential for localized, and perhaps harmful, organic compound vaporization does exist. Drum waste samples and surface soil/sediment samples from pools atop the landfill have shown total volatile organics concentrations exceeding 2,000 ppb at several locations in the landfill area. Volatilization of these compounds should be considered as a potential contaminant migration mechanism, and thus a potential threat to the local population.

Enforcement

In 1969, the Sinclair Refining Company merged with the Atlantic Richfield Company (ARCO), identified as a potentially responsible party. EPA began discussions with ARCO in August 1982. On January 6, 1983, NYSDEC and EPA met with ARCO to discuss measures to prevent further erosion of the landfill by the Genesee River. As a result of that meeting, on January 21, 1983, ARCO removed drums that had washed out of the landfill. EPA met with ARCO again on January 31 and February 7, 1983 to discuss, further, erosion control remedial measures. The RI and FS were also discussed at the February 7th meeting. Because ARCO had not committed to further measures needed to prevent additional landfill materials from entering the Genesee River, or to any other cleanup activities at the site, a notice letter was sent on March 7, 1983. That letter discussed NYSDEC's and EPA's intent to conduct the RI, FS, and initial remedial measures to prevent further erosion of the landfill. The State subsequently expended its own funds to construct a dike as a temporary protective measure. After further negotiations with NYSDEC, ARCO contributed the funds to strengthen and raise the dike and to reimburse the State for its prior dike-related expenditures.

It is EPA's and NYSDEC's intention to offer the implementation of the remedy to ARCO. If it appears that ARCO is not willing to implement the remedy, or if these negotiations are fruitless, then EPA may consider the issuance of a CERCLA §106 Administrative Order for the implementation of the remedial action, or EPA may initiate a cost recovery lawsuit at a later date.

Alternatives Evaluation

The primary objective of the FS was to evaluate remedial alternatives to identify a cost-effective approach consistent with the goals and objectives of CERCLA. A cost-effective remedial alternative as defined in the NCP (40 CFR 300.68j) is "the lowest cost alternative that is technologically feasible and reliable and which effectively mitigates and minimizes damage to and provides adequate protection of the public health, welfare, or the environment." The NCP outlines procedures and criteria to be used in selecting the most cost-effective alternative.

The first step is to evaluate public health and environmental effects and welfare concerns associated with the problem. Criteria to be considered are outlined in 40 CFR Section 300.68(e) of the NCP and include such factors as actual or potential direct contact with hazardous material, degree of contamination of drinking water, and extent of isolation and/or migration of the contaminant.

The next step is to develop a limited list of possible remedial alternatives which could be implemented. The no-action alternative should be included on the list.

The third step in the process is to provide an initial screening of the remaining alternatives. The cost, relative effectiveness in minimizing threats, and engineering feasibility are reviewed here. The no-action alternative should be included for further evaluation when response actions may cause greater environmental or health damage than no-action responses. A no-action alternative should also be included if it is appropriate relative to the extent of the existing threat or if response actions provide no greater protection.

From the evaluation of the data and information on the nature and the extent of the contamination associated with the Sinclair Refinery site landfill, the following objectives were established:

1. maintenance of a safe, uncontaminated drinking water supply for the Village of Wellsville
2. protection of Genesee River water quality and associated uses (potable water supply, fishing, recreation) from contaminant releases
3. protection of local ground water, which discharges to the Genesee River, from contaminant migration
4. prevention of direct contact between humans and animals with contaminated site materials, including soil and leachate
5. avoidance of site inundation from increased river flow associated with a 100-year storm event
6. avoidance of site erosion from a 100-year storm event

Remedial response criteria for the landfill were divided into criteria for ground and surface water and criteria for subsurface and surface soil.

Water-related remedial response criteria were based upon published State ground-water standards and ambient water quality criteria for potable water supplies for the constituents found in ground- and surface-water samples at the site (see Table 13). In general terms, contaminated ground water beneath the landfill site and surface water within the site and the Genesee River will be controlled such that perimeter monitoring wells or river samples show total organics concentrations of 100 ppb or less.

Soils criteria were calculated based upon State ambient water quality criteria, compound solubilities in water, and soil/water partition coefficients. These calculations generated the soil concentration of an organic compound causing a ground-water concentration meeting the ambient limit. Table 14 lists, for each organic contaminant found in the soils medium, its water solubility, partition coefficient, and subsurface soils criteria. Subsurface and surface soils at the site will be controlled in such a manner that contaminant levels in excess of the listed criteria do not runoff or otherwise contact plant or animal life.

With these objectives and response criteria in mind, a list of feasible remedial technologies was developed (see Table 15). Technologies identified as having the potential to meet the remedial response objectives were subjected to a two-step evaluation process. The first step consisted of an initial screening of candidate remedial technologies based upon cost, environmental impacts, and engineering considerations. The second step consisted of a more thorough evaluation of specific alternatives.

REMEDIAL CRITERIA FOR GROUND WATER AND SURFACE WATER

Compound	Criteria[1] (ppb)	Notes[4]
Priority Volatile Organics		
*benzene	ND	K
*chlorobenzene	5	C
*trans-1,2-dichloroethylene	[50]	F
*1,1,2,2-tetrachloroethane	0.3	E
*toluene	10	A
*vinyl chloride	1	E
*1,1,1-trichloroethane	[50]	F
Priority Base/Neutral Extractables		
*fluoranthene	0.2[3]	G(b)
*bis-(2-ethyl hexyl) phthalate	0.6	B(a), C
*fluorene	[50]	F
*D-n-octyl phthalate	[50]	F
*2-methyl napthalene	[50]	F
*napthalene	10	I
*phenanthrene	[50]	F
*pyrene	0.2[3]	G(b)
Priority Acid Extractables		
*2,4-dimethylphenol	1	K, I
Cyanides and Phenolics		
Total Cyanide	5[2]	C
*Total recoverable phenols	1	K, I
Priority Metals		
arsenic	5	C, D
copper	4.0	B(b), C
nickel	7.1	B(b), C
selenium	1.0	B(a), C
silver	0.1	C
zinc	30	C
Priority Pesticides		
*chlordane	0.004	B(b), C, D
*toxaphene	0.007	B(b), C
*endrin	0.002	B(a), C, D
*heptachlor and heptachlor epoxide	0.001	B(a,b), C, D
*4,4'-DDD and 4,4'-DDE	0.001	B(c), D
PCBs	.0095	E
Nonpriority Volatile Organics		
*cyclohexane	[50]	F
*methylcyclohexane	[50]	F
*methyl-1-pentene	[50]	F
*3,4,4-trimethyl-4-pentene	[50]	F
*xylene	[50]	F
Nonpriority Base/Neutral Extractables		
*docosane	[50]	F
*eicosane	[50]	F
*heptadecane	[50]	F
*hexadecane	[50]	F
*octadecane	[50]	F
*pentadecane	[50]	F
*1,3,5-trimethylbenzene	[50]	F
*4-methyl-4-hydroxyl-2-pentanone	[50]	F

Source: Ambient Water Quality Criteria (Revised: May 1984)
New York State Department of Environmental Conservation

ND - Not detectable
* - Sum of these compound concentrations shall not exceed 100 ppb.
[50] - Limit derived using Department of Health general organic chemical guideline (50 ppb).

(1) Criteria represents the most stringent limits within the New York State Criteria for Human and Aquatic Class Waters.

(2) Free cyanide.

(3) This criterion also applies to the sum of benz(a)anthracene, benzofluoranthene, benzo(a)pyrene, chrysene, fluoranthene, indeno(1,2,3-cd)pyrene, methylbenz(a)anthracene, and pyrene.

(4) Alpha numeric designations from NYSDEC Ambient Water Quality Criteria documented as follows:

A. Organoleptic (aquatic life concern) - Use MA30CD/10 flow to calculate 30-day average effluent limit.

B. Criterion based on aquatic concerns as determined by other agencies as follows:
a) International Joint Commission (IJC)
b) EPA
c) 40 CFR Part 129, Ambient Water Quality Criteria

C. Toxicity to aquatic life - Use MA7CD/10 flow to calculate maximum daily effluent limits.

D. Fish flesh consumption - Use MA30CD/10 flow to calculate 30-day average effluent limit.

E. Cancer risk calculations (human health concerns) - Use MA30CD/10 flow to calcualte 30-day average effluent limit.

F. DOH general organic guideline for protection of human health - Use MA30CD/10 flow to calculate 30-day average effluent limit.

G. Criterion based on human health concerns as determined by other agencies, as follows: (Use MA30CD/10 flow to calculate 30-day average effluent limit except for nitrate where an MA7CD/10 flow to calculate a maximum daily effluent limit will be used.)
a) EPA
b) World Health Organization (WHO)
c) National Academy of Sciences (NAS)

I. Organoleptic (human health concerns) -Use MA30CD/10 flow to calculate 30-day average effluent limit.

K. Class GA ground-water quality standard from 6NYCRR Part 703, based on best use as source of potable water supply.

Table 13

REMEDIAL CRITERIA FOR SOILS

Compound	Solubility in Water (ppm)	Partition Coefficient	Criteria (ppb)
Priority Volatile Organics			
benzene	700	120	24
chlorobenzene	500	143	36
trans-1,2-dichloroethylene	600	130	325
1,1,2,2-tetrachloroethane	150	356	5
toluene	500	143	72
vinyl chloride	1.1	4,043	207
Priority Base/Neutral Extractables			
fluoranthene	0.265	9,062	91
Priority Acid Extractables			
2,4-dimethylphenol			
Cyanides and Phenolics			
Total Cyanide			
Total recoverable phenols	82	387	19
Priority Metals			
arsenic	N/A	N/A	15,000
copper	N/A	N/A	9,700
nickel	N/A	N/A	26,300
selenium	N/A	N/A	ND
silver	N/A	N/A	600
zinc	N/A	N/A	53,000
Priority Pesticides			
chlordane	0.056	21,306	4
toxaphene			
endrin			
heptachlor and heptachlor epoxide			
4,4'-DDD	0.16	11,960	0.6
4,4'-DDE	0.0013	168,784	8.4
PCBs	0.04	25,637	12.1
Nonpriority Volatile Organics			
cyclohexane	45	538	1,345
methylcyclohexane	14	1,000	2,500
methyl-1-pentene	78	398	995
3,4,4-trimethyl-4-pentene			
xylene	175	255	637
Nonpriority Base/Neutral Extractables			
docosane			
eicosane			
heptadecane	0.006	72,780	181,950
hexadecane	0.004	90,963	227,408
octadecane	0.007	66,865	167,163
pentadecane	0.002	133,178	332,945
1,3,5-trimethylbenzene			
siloxane			
4-hydroxyl-4 methyl-2 pentanone			
hexadecanoic acid			

Table 14

SUMMARY OF AVAILABLE REMEDIAL TECHNOLOGIES

- A. Source Control Measures

    - a. No action
    - b. Surface grading and revegetation
    - c. Collection and treatment of contaminated surface runoff
    - d. Excavation and disposal
    - e. Excavation to on-site secure landfill
    - f. In-situ treatment of wastes
        - 1. incineration
        - 2. solidification
        - 3. biological destruction
    - g. Installation of impermeable barriers
        - 1. slurry walls
        - 2. surface cap
        - 3. complete encapsulation
    - h. Landfill bank stabilization
- B. Off-Site Migration Control Measures
    - a. No action
    - b. Ground-water controls
        - 1. slurry walls
        - 2. pumping
    - c. Ground-water recovery and treatment
    - d. Dredging of contaminated river sediments
    - e. River rechannelization (flood protection)

Table 15

Because of the meandering tendencies and the signifcant flood potential of the Genesee River, any remedial containment measure implemented at the Landfill site might be subject to flood inundation and erosion unless protected by a bank stabilization or channelization measure. Therefore, technologies to protect the landfill river bank from flooding were considered in the development of alternatives.

From the list of available remedial technologies applicable source control and off-site migration control remedial measures were formulated and were subjected to an initial screening in terms of cost, environmental impacts, and engineering considerations.

Source control measures evaluated included:

1. No action
2. Collection of contaminated runoff with on-site treatment
3. Collection of contaminated runoff with Publically-Owned Treatment Works (POTW) treatment
4. Collection of leachate with on-site treatment
5. Collection of leachate with POTW treatment
6. Waste and contaminated soil excavation and disposal at existing secure landfill
7. Waste and contaminated soil excavation and disposal at a new secure landfill
8. Waste and contaminated soil excavation and on-site disposal
9. Waste and contaminated soil excavation and incineration followed by residue disposal on-site
10. Waste and contaminated soil excavation, followed by solidification and on-site disposal
11. Waste and contaminated soil excavation, followed by biological destruction and on-site disposal
12. In-situ waste and contaminated soil solidification
13. In-situ waste and contaminated solid biological destruction
14. Surface grading and revegetation, CELA and SLA
15. Surface grading and revegetation, SLA relocated to CELA
16. Installation of perimeter slurry walls, CELA and SLA
17. Installation of slurry walls, SLA relocated to CELA
18. Installation of RCRA surface cap, CELA and SLA
19. Installation of RCRA surface cap, SLA relocated to CELA
20. Landfill bank stabilization with modified slopes
21. Landfill bank stabilization with existing slopes
22. Landfill bank stabilization with structures

Off-site mitigative controls evaluated included:

1. No action
2. Installation of upgradient slurry walls
3. Installation of upgradient pumping system
4. Ground water recovery, on-site treatment
5. Ground water recovery, treatment at POTW
6. Dredging of contaminated sediment, disposal in on-site secure landfill
7. Dredging of contaminated sediment, off-site disposal at existing secure landfill
8. Dredging of contaminated sediment, off-site disposal in new secure landfill
9. River flow control with open channels
10. River flow control with dikes
11. River flow control with enclosed channels
12. River flow controls with groins
13. River flow control with check dams

Tables 16 and 17 summarize the initial screening of remedial technologies, listing summary conclusions of their public health/environmental impacts, feasibility and costs. Costs are not listed for those technologies rejected on the basis of insignificant additional public health or environmental protection, poor technical executability, or poor reliability. Technologies rejected on a strictly non-cost basis include:

- Collection of leachate/on-site treatment

- Collection of leachate/POTW treatment

- Solidification of waste/soil

- Biological destruction of waste/soil

- In-situ solidification of waste/soil

- In-situ bio-destruction of waste/soil

- Upgradient slurry walls

SUMMARY OF INITIAL SCREENING OF REMEDIAL TECHNOLOGIES

TECHNOLOGY	PUBLIC HEALTH/ ENVIRONMENTAL PROTECTION	FEASIBILITY			ORDER-OF-MAGNITUDE COSTS (CAPITAL/ANNUAL O & M)
		IMPLEMENTABILITY	TECHNICAL EXECUTABILITY	RELIABILITY	
A. SOURCE CONTROL MEASURES					
A.a. No action	Essentially no protection Possible adverse impacts	Implementable	Executable	Not reliable	$ 100,000/$ 30,000
A.b.1 Collection of contaminated surface runoff, on-site treatment	Limited additional protection (as compared to no action)	Implementable	Executable	Reliable	$ 1,000,000/$ 80,000
A.b.2 Collection of contaminated surface runoff, treatment at POTW	Limited additional protection	Implementable, w/POTW concurrence	Executable	Reliable	$ 1,000,000/$ 80,000
A.c.1 Collection of leachate, on-site treatment	Insignificant additional protection	Implementable	Not executable	Not reliable	Not Calculated
A.c.2 Collection of leachate, treatment at POTW	Insignificant additional protection	Implementable, w/POTW concurrence	Not executable	Not reliable	Not Calculated
A.d.1(a) Excavation of waste and soil, off-site disposal at existing secure landfill	Maximum additional protection	Questionable, due to capacity	Questionable, due to capacity	Reliable	$39,000,000/$0
A.d.1(b) Excavation of waste and soil, off-site disposal at new secure landfill	Maximum additional protection	Questionable, due to siting	Questionable, due to siting	Reliable	$23,000,000/$ 30,000
A.d.2 Excavation of waste and soil, disposal in on-site secure landfill	Significant additional protection	Implementable	Executable	Reliable	$20,000,000/$ 30,000
A.d.3 Incineration of waste and soil, disposal in on-site secure landfill	Significant additional protection	Implementable	Executable	Questionable, due to waste characteristics	$45,000,000/$4,000,000 /$ 30,000
A.d.4 Solidification of waste and soil, on-site disposal	Significant additional protection	Implementable	Not executable, due to waste characteristics	Not reliable	Not Calculated

Table 16

SUMMARY OF INITIAL SCREENING OF REMEDIAL TECHNOLOGIES

TECHNOLOGY	PUBLIC HEALTH/ ENVIRONMENTAL PROTECTION	FEASIBILITY			ORDER-OF-MAGNITUDE COSTS (CAPITAL/ANNUAL O & M)
		IMPLEMENTABILITY	TECHNICAL EXECUTABILITY	RELIABILITY	
A. SOURCE CONTROL MEASURES	(Continued)				
A.d.5 Biological destruction of waste and soil, disposal in on-site secure landfill	Significant additional protection Possible adverse impacts	Implementable	Not executable, due to waste characteristics	Not reliable	Not Calculated
A.e.1 In-situ solidification of waste and soil	Limited additional protection	Implementable	Not executable, due to waste characteristics	Not reliable	Not Calculated
A.e.2 In-situ biological destruction of waste and soil	Limited additional protection Possible adverse impacts	Implementable	Not executable, due to waste characteristics	Not reliable	Not Calculated
A.f.1(a) Surface grading and revegetation, CELA and SLA	Limited additional protection	Implementable	Executable	Reliable	$1,000,000/$ 30,000
A.f.1(b) Surface grading and revegetation, SLA relocated to CELA	Limited additional protection	Implementable	Executable	Reliable	$2,000,000/$ 30,000
A.f.2(a) Installation of perimeter slurry walls, CELA and SLA	Limited additional protection	Implementable	Executable	Reliable	$1,000,000/$ 30,000
A.f.2(b) Installation of slurry walls, SLA relocated to CELA	Limited additional protection	Implementable	Executable	Reliable	$3,000,000/$ 30,000
A.f.3(a) Installation of RCRA surface cap, CELA and SLA	Limited additional protection	Implementable	Executable	Reliable	$4,000,000/$ 30,000
A.f.3(b) Installation of RCRA surface cap, SLA relocated to CELA	Limited additional protection	Implementable	Executable	Reliable	$4,000,000/ 30,000
A.g.1 Landfill bank stabilization with modified slopes	Limited additional protection Possible adverse impacts	Implementable	Executable	Reliable	$4,000,000/$ 1,000

Table 16

Continued

SUMMARY OF INITIAL SCREENING OF REMEDIAL TECHNOLOGIES

TECHNOLOGY	PUBLIC HEALTH/ ENVIRONMENTAL PROTECTION	FEASIBILITY			ORDER-OF-MAGNITUDE COSTS (CAPITAL/ANNUAL O & M)
		IMPLEMENTABILITY	TECHNICAL EXECUTABILITY	RELIABILITY	
B. MIGRATION MANAGEMENT CONTROL MEASURES					
B.a. No action	Essentially no protection Possible adverse impacts	Implementable	Executable	Not reliable	$ 0 /$ 30,000
B.b.1 Installation of upgradient slurry walls	Insignificant additional protection (as compared to no action) Possible adverse impacts	Questionable, due to siting	Executable	Questionable	Not Calculated
B.b.2 Installation of upgradient pumping system	Insignificant additional protection Possible adverse impacts	Questionable, due to siting and permitting	Executable	Questionable	Not Calculated
B.c.1 Ground water recovery, on-site treatment	Insignificant additional protection	Implementable	Executable	Reliable	$ 2,000,000/$ 150,000
B.c.2 Ground water recovery, treatment at POTW	Insignificant additional protection	Implementable, w/POTW concurrence	Executable	Reliable	$ 1,000,000/$ 150,000
B.d.1 Dredging of contaminated sediment, disposal in on-site secure landfill	Insignificant additional protection	Implementable	Executable	Reliable	Not Calculated
B.d.2(a) Dredging of contaminated sediment, off-site disposal at existing secure landfill	Insignificant additional protection	Implementable	Executable	Reliable	Not Calculated
B.d.2(b) Dredging of contaminated sediment, off-site disposal in new secure landfill	Insignificant additional protection	Questionable, due to siting	Questionable due to siting	Reliable	Not Calculated
B.e.1 River flow control with open channels	Limited additional protection Possible adverse impacts	Implementable	Executable	Reliable	$14,000,000/$ 1,000
B.e.2 River flow control with dikes	Limited additional protection Possible adverse impacts	Implementable	Executable	Reliable	$10,000,000/$ 1,000

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Table 16

Continued

TECHNOLOGY SCREENING SUMMARY

		LANDFILL BANK STABILIZATION			RIVER FLOW CONTROL				
		PROTECTION WITH A STRUCTURE	PROTECTION ON THE EXISTING SLOPE	PROTECTION ON A MODIFIED SLOPE	OPEN CHANNEL	ENCLOSED CHANNEL	GROINS	CHECK DAMS	DIKES
TECHNICAL CRITERIA	SITE-SPECIFIC FEASIBILITY	Yes	Yes, Dike Required For Flood Control	Yes, Dike Required For Flood Control	Yes	Yes, Transverse Dike Required For Flow Control	No, Unfavorable Channel Configuration	No, Unfavorable Hydraulic Restriction	Yes
	RELIABILITY	20-30 Year Design Life Scour & Undercutting	Proprietary, Unproven, Or Uncommon Technology Structural Integrity Scour & Undercutting	Yes, Long Term	Yes, Long Term	25-30 Year Design Life Scour & Undercutting	Yes, Long Term	20-30 Year Design Life	Yes, Long Term
	OPERATIONAL REQUIREMENTS	Periodic Inspection and Maintenance	Periodic Inspection and Maintenance	Inspection After Major Storms	Inspection After Major Storms	Periodic Inspection and Maintenance	Inspection After Major Storms	Periodic Inspection and Maintenance	Inspection After Major Storms
	IMPLEMENTATION TIME	Complete In One Construction Season	Complete In One Construction Season	Complete In One Construction Season	Complete In One Construction Season	Complete In One To Two Construction Seasons	Complete In One Construction Season	Complete In One Construction Season	Complete In One Construction Season
ENVIRONMENTAL & PUBLIC HEALTH CRITERIA	SHORT TERM	Exposure/Excavation Of Landfilled Waste Incidental Borrow & Waste Disposal	Exposure/Excavation of Landfilled Waste	Earthwork/Channel Effects Incidental Borrow & Waste Disposal Minor Loss of Adjacent Land	Earthwork/Channel Effects Incidental Borrow & Waste Disposal Minor Loss of Adjacent Land	Earthwork/Channel Effects Incidental Borrow & Waste Disposal Loss and Disturbance of Land	Eliminated	Eliminated	Earthwork/Channel Effects Incidental Borrow & Waste Disposal Transverse Dikes-Disturbance of Land
	LONG TERM	Potential For Catastrophic Failure Periodic West Bank Flooding	Potential For Catastrophic Failure Periodic West Bank Flooding Potential Protection/Waste Reactions	Periodic West Bank Flooding Worst Aesthetics	Periodic West Bank Flooding Best Aesthetics	Impact On Downstream Flood & Erosion Protection Additional Backwater Flooding			Periodic West Bank Flooding
COST CRITERIA	CAPITAL	Eliminated	Eliminated	Comparable-Low	Comparable-High	Eliminated			Comparable-Low
	OPERATION & MAINTENANCE			Minimal	Minimal				Minimal

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Table 17

- Landfill bank stabilization with existing slope
- Landfill bank stabilization with a structure
- Upgradient pumping system
- Dredging sediments/on-site disposal
- Dredging sediments/off-site secure landfill
- Dredging sediments/new off-site secure landfill
- River flow control with enclosed channels
- River flow control with groins
- River flow control with check dams

A number of technologies were rejected because of their high cost-to-benefit ratio. That is, these technologies had costs generally several times or an order-of-magnitude greater than other technologies (or combinations of technologies) that achieved similar public health and environmental protection. Technologies rejected on this basis include:

- Collection of runoff/on-site treatment
- Collection of runoff/POTW treatment
- Excavation/off-site secure landfill
- Excavation/new off-site secure landfill
- Excavation/incineration/on-site secure landfill for waste/soil
- Surface grading/SLA relocated to CELA
- Slurry walls/SLA relocated to CELA
- Ground water recovery/on-site treatment
- Ground water recovery/POTW treatment

Collection and treatment of contaminated runoff and ground water were rejected since their order-of-magnitude installed costs were comparable to that associated with surface grading, revegetation, and slurry wall installation, yet had significantly greater operation and maintenance costs. Excavation and redisposal of wastes in off-site secure landfills was rejected primarily due to significant (order-of-magnitude) cost as compared to Resource Conservation and Recovery Act (RCRA) capping and slurry wall installation to the limiting clay aquaclude. Construction of a new off-site landfill was also rejected because siting problems were considered to have the potential for long implementation delays.

It should be noted that rejection of all off-site disposal technologies in the screening process makes it impossible to consider a remediation alternative "specifying off-site storage, destruction, treatment, or secure disposal of hazardous subtances at a facility approved under RCRA." The screening makes it clear, however, that off-site disposal of Landfill site wastes is both extraordinarily costly.

The RI and follow-up work indicate that leachate generation and contaminant migration via the ground water to the Genesee River appear not to be a significant pathway. Thus, those technologies remaining are not specifically related to leachate or ground-water control. Furthermore, since no ground water plume of contamination is identified at this time, it is believed that off-site contaminant migration is primarily a function of surface runoff caused by periodic rainfall and Genesee River flooding. Therefore, technologies that stress this pathway of contamination, such as surface treatments and river controls, appear most appropriate for further consideration.

Table 18 provides a listing of those technologies that survived the screening process. These technologies were combined to generate alternative remedial systems (see Table 19). These systems were then evaluated in order to recommend a cost-effective remedial alternative.

The narrowed list of remedial alternative was furthered evaluated according to the following criteria: feasibility to site-specific conditions, reliability, operational requirements, implementation time, and environmental and public health impacts.

TECHNOLOGIES SURVIVING INITIAL SCREENING

A. SOURCE CONTROL MEASURES

No action

Surface grading and revegetation, CELA and SLA

Installation of perimeter slurry walls, CELA and SLA

Installation of RCRA surface cap, CELA and SLA

Installation of RCRA surface cap, SLA relocated CELA

Landfill bank stabilization with modified slopes

B. MIGRATION MANAGEMENT CONTROL MEASURES

No action

River flow control with open channels

River flow control with dikes

Table 18

REMEDIAL ACTION ALTERNATIVES

Alternative Number	USEPA Policy Reference	Component Technologies
I	No action	No action
II	Alternative exceeding applicable public health/environmental criteria	Installation of perimeter slurry walls, CELA and SLA, Installation of RCRA surface cap, CELA and SLA. River flow control with open channels (full channelization).
III	Alternative attaining applicable public health/environmental criteria	Installation of perimeter slurry walls, CELA and SLA. Installation of a clay cap CELA and SLA. River flow control with dikes (partial channelization).
IV	Alternative attaining applicable public health/environmental criteria	Installation of RCRA surface cap, CELA and SLA. River flow control with open channels (full channelization).
V	Alternative attaining applicable public health/environmental criteria	Installation of RCRA surface cap, CELA and SLA. River flow control with open channels (partial channelization).
VI	Alternative attaining applicable public health/environmental criteria	Relocation of SLA onto CELA. Installation of RCRA surface cap, CELA. River flow control with open channels (partial channelization).
VII	Alternative attaining applicable public health/environment criteria.	Installation of clay clap, CELA and SLA. River flow control with dikes (partial channelization).
VIII	Alternative minimizing contaminant migration and protecting public health/environment but not attaining applicable criteria	Installation of clay cap, CELA and SLA. Landfill bank stabilization with modified slopes.

Table 19

According to the NCP, a total cost estimate must also be considered for remedial actions and must include both construction and annual operation and maintenance costs. These costs are estimated for the alternatives under consideration. A present worth value analysis was used to convert the annual operation and maintenance costs to an equivalent single value. These costs were considered over a 20-year period at a 10 percent discount rate and 5 percent inflation.

•Alternative I

No Action, Alternative I, would involve no remedial actions on any of the affected media at the Lanfill site, and no controls on runoff, bank erosion, flooding, or leachate generation. Access to the Landfill Site would be completely controlled by the erection of a chain-link fence around the landfill perimeter. Existing perimeter ground-water monitoring wells would be utilized for long-term monitoring.

The only operation and maintenance requirements associated with this alternative are those associated with periodic inspection and repair of the perimeter fence and regular sampling and analysis of ground water from perimeter wells.

Because the soil cover of the landfill and the buried wastes are relatively impermeable, rather than perolocating through the waste to yield contaminated ground water, most rainfall travels over the surface of the landfill, carrying surface contamination along with it, either running off into the Genesee River or pooling at low points on the landfill. Under no action, a rise in river stage or a severe storm could allow transport of these pooled contaminants into the Genesee River. In addition, failure of the dike currently protecting the CELA could allow the release of waste materials from the landfill into the river.

Although no action is feasible and has minimal operational requirements, it offers little protection to public health and the environment. This alternative would only control direct access to the Landfill site. It would do nothing to control continued runoff of contaminated soils, bank erosion or flooding.

•Alternative II

Alternative II, slurry walls, RCRA cap, and full river channelization, combines two source control measures with a migration management technology, yielding maximum public health and environmental benefits. This alternative would eliminate runoff of contaminated surface soils, prevent bank erosion and Landfill site flooding, and fully isolate contaminated subsurface waste, soils and ground water from the surrounding environment. The entire Landfill site perimeter would also be fenced.

This alternative includes the installation of low permeability 3-foot wide bentonite clay/soil slurry wall around both the CELA and SLA to an average depth of 35± feet beneath the CELA and 20± feet beneath the SLA. The slurry wall would be cut approximately five feet into the clay aquaclude so as to provide a continuous ground-water containment system.

The RCRA cap, incorporating a 2-foot clay liner, geofabric, 1-foot witness layer for leak detection, 1.5 feet of sandy soil, and 6 inches of top soil, would be designed to prevent essentially all infiltration of rainwater into the landfills. Overlaying the perimeter slurry walls, the cap would provide continuous impermeable barriers around all sides of the CELA and SLA. The cover would be placed after removal of exposed drums and all vegetation, and the filling of depressions with clean soil.

Two leachate/groundwater sumps would maintain a hydraulic gradient into the landfills, assuring the containment of contamination within the slurry walls. The pumped liquid will be stored on the Landfill site until sufficient volume is collected to remove by tank truck for dispoal, or will be treated on-site or at a waste water treatment plant.

This alternative also includes full channelization of the Genesee River from the extreme southern tip of the Landfill site, 3,000 linear feet to the existing flood control structures below the northern tip of the Landfill site. This relocation widens and moves the river channel away from the Landfill site, provides stable riprap banks along both sides, and eliminates the threats of landfill erosion and flood inundation (100-year flood protection).

For full river channelization, 35 acres would be disturbed by construction activities, requiring temporary sedimentation and erosion control measures.

Because of the extensive channelization and the slurry wall construction requirements associated with this alternative, three construction seasons will probably be required.

Construction of shallow slurry walls and river channelization are both feasible and reliable. Because of the full river channelization away from the landfill along its entire reach, and the RCRA cap and slurry wall, this is the most redundant, most protective remedial alternative.

•Alternative III

Alternative III, clay cap*, slurry walls, and partial river channelization, is similar to Alternative II in that it utilizes fencing, surface grading/revegetation, slurry walls and internal hydrualic control, however the surface regrading involves a far less extensive capping than required by RCRA. Also, the Genesee River controls are less extensive and closer to the edges of the CELA and SLA than full channelization. Partial channelization of the Genesee River would extend roughly from the southern tip of the SLA to the existing flood control structures below the northern tip of the CELA. This relocation would widen the river in two stages and move the river channel away from the Landfill site, providing stable riprap banks along both sides and eliminating the threats of landfill erosion and flood inundation (100-year flood protection). The cap, under Alternative III would not provide the level of protection from rainfall infiltration that a RCRA cap would, however, this alternative would provide slurry wall protection and would severely limit rainfall infiltration, particularly in the currently uncapped SLA. The cap, overlaying the perimeter slurry walls, would provide continuous, relatively impermeable barriers around all sides of the CELA and SLA.

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*Generally, a clay cap utilizes 2 feet of clay and 6 inches of top soil. But because the frost line is located 4 feet below the ground surface in this area, to prevent freeze-thaw heaving, which could have a detrimental impact on the integrity of the surface seal, 3 feet of clay, 1-foot of soil, and 6 inches of top soil were utilized for the clay cap.

To accommodate partial river channelization, placement of the slurry walls and cap will require relocation of waste material at some points along the perimeter. Also, excavation and handling of hazardous materials will be required at the northern and southern ends of the Landfill site.

For partial river channelization, 28 acres would be disturbed by construction activities, requiring temporary sedimentation and erosion control measures.

Because only partial channelization is called for, two to three construction seasons should be sufficient to implement this alternative.

This alternative addresses all aspects of the Landfill site problem and controls all pathways of contamination, providing somewhat less protection to public health and the environment than Alternative II due to the less redundant nature of the cap and the less extensive control over the Genesee River. It still, however, meets all Landfill site remediation criteria, and is feasible and reliable.

•Alternative IV

Alternative IV, RCRA cap and full river channelization, combines a single source control measure (RCRA cap) and a single migration management measure (full 100-year flood protection river channelization). Its significant difference from Alternatives II and III is the lack of slurry wall perimeter controls. Elimination of slurry walls will not produce the effectiveness of this alternative, however, since, at this time, ground water movement appears to be an insignificant pathway of contaminant migration. RCRA capping will eliminate any surface water infiltration and subsequent leachate generation, particularly in the SLA.

The full channelization away from the landfill along its entire river reach provides maximum protection from flooding. The RCRA cap provides maximum protection from infiltration.

Because of the extensive construction requirement associated with full channelization, three construction seasons will probably be required.

This alternative attains applicable public health and environmental criteria, addressing the critical aspects of the Landfill site problem, contaminant migration via surface runoff, bank erosion and flooding, but it does not control movement of ground water under the Landfill site. The required technologies are both feasible and reliable.

•Alternative V

Alterntive V, RCRA cap and partial river channelization, combines a single source control measure and a single migration management measure. Its significant difference from Alternative IV is the use of partial river channelization instead of full river channelization.

Under partial river channelization, excavation and handling of hazardous materials will be required at the northern and southern ends of the Landfill site.

Two to three construction seasons would be required to implement this alternative.

This alternative addresses the critical aspects of the Landfill site problem, contaminant migration via surface runoff, bank erosion, and flooding. It does not, however, control the movement of ground water under the site, and it provides less flood protection than full channelization. The required technologies are both feasible and reliable.

·Alternative VI

Alternative VI, consolidations of SLA waste on the CELA, RCRA Cap, and partial river channelization, involves two source control measures, excavation and RCRA capping, and a migration management technology, 100-year flood protection via partial river channelization.

Because the SLA would be excavated and replaced with clean fill under this alternative, partial river channelization of the Genesee River would only have to extend roughly from the borrow pit area south of the CELA to the existing flood control structures, requiring about 1000-linear feet less riprap than the partial river channeliztion described under Alternative III.

Even though more cover material will be required to accommodate the increased height of the CELA, resulting from the addition of the waste excavated from the SLA, because capping of the SLA will no longer be required, an overall savings of cover material as compared to all the other alternatives will be realized.

Excavation of the 2.3-acre landfill to a depth of 25 feet is technically feasible and reliable, however, it poses some risk to the on-site workers and the local population. However, with the utilization of proper health and safety measures during excavatin this shortterm exposure risk will be minimized. Flooding and erosion during the operation are also of concern. Because the waste will not be removed from the site, the risk to the public associated with hauling hazardous waste from the site would be eliminated.

Because of the excavation and construction requirements associated with this alternative, two to three construction seasons would probably be required.

This alternative addresses the critical aspects of the Landfill site problem, contaminant migration via surface runoff, bank erosion, and flooding. The required technologies are both feasible and reliable.

•Alternative VII

Alternative VII, clay cap and partial river channelization, includes one source control technology, grading with clay capping, and one migration management technology, 100-year flood protection via partial river channelization.

Under partial river channelization, excavation and handling of hazardous materials will be required at the northern and southern ends of the Landfill site.

Two to three construction seasons would probably be required to implement this alternative.

This alternative addresses the critical aspects of the Landfill site problem, contaminant migration via surface runoff, bank erosion, and flooding, but provides significantly less protection than the alternatives employing RCRA caps and/or full river channelization. It also employs feasible and reliable technologies.

•Alterantive VIII

Alternative VIII, clay cap and bank stabilization, involves the application of two source control technologies, grading with clay capping as in Alternative III, and stabilization of the existing Landfill site banks with riprap and dikes, without river channelization, but providing 100-year flood protection.

This alternative allows the Genesee River to remain in its established channel. This bank stabilization and flood control technology is the least protective of the options considered. It does nothing to control Genesee River flood waters other than protecting the Landfill site from inundation. This leaves the banks vulnerable to possible flood damage and erosion.

Under this alternative, riprap will protect the existing dike embankment, but not the river channel bank at all points along the Landfill site-river interface. This alternative has only a fair potential for success since it is vulnerable to uncontrolled Genesee River flood waters.

For bank stabilization, a total of 15 acres would be disturbed by construction activities, requiring temporary sedimentation and erosion control measures. One to two construction seasons should be sufficient to implement this alternative.

This alternative provides public health and environmental protection but may not meet all applicable criteria. This alternative addresses the critical aspects of the Landfill Site problem: contaminant migration via surface runoff, bank erosion, and flooding, but does not effectively controlling the river since it includes no channelization work. The technologies employed under this alternative are both feasible and reliable.

Tables 20 and 21 summarize the screening of alternatives. Table 22 shows the various costs associated with the alternatives considered in the final evaluation.

Community Relations

Throughout the RI, FS, and focused FS for an initial remedial measure, all data and reports have been submitted to interested citizens, elected officials, the PRP, and the local library, which serves as a public repository.

The public has expressed significant concern regarding the potential threat from the Sinclair Refinery site. In addition to the potential acute effects that may be associated with flood conditions, residents are concerned with the long-term chronic effects of exposure to chemicals that may be released from the site. The Wellsville Rod and Gun Club has established the health of the community as the foremost concern in their attempts to activate the community. The first public meeting, sponsored by the Rod and Gun Club, included a public panel discussion with EPA and NYSDEC in February 1983 to address the community's concerns. The primary concern expressed at this and subsequent meeting was the threat to the water supply from the site.

NON COST DECISION MATRIX FOR LANDFILL SITE REMEDIAL ALTERNATIVES

CRITERIA	I	II	III	IV	V	VI	VII	VIII
Technical:								
Feasibility to Site-Specific Conditions	Good	Good	Good	Good	Good	Good	Good	Good
Reliability -								
Potential for success (Level of Confidence)	Poor	Good	Fair/Good	Fair/Good	Fair/Good	Fair/Good	Fair	Fair
Demonstrated performance in similar applications	Poor	Good	Good	Good	Good	Good	Good	Fair/Good
Operational Requirements	Low	Low/Moderate	Low/Moderate	Low	Low	Low	Low	Low/Moderate
Implementation Time (months) -								
Design/Construction	4-6	30-36	24-30	30-36	24-30	24-30	24-30	18-24
Achievement of Beneficial Results	4-6	30-26	24-30	30-36	24-30	24-30	24-30	18-24
Environment and Public Health:								
Short Term Impacts (construction related) -								
Local Populace (immediately around site)	None	Adverse	Adverse	Adverse	Adverse	Adverse	Adverse	Slightly Adverse
Population-at-Large (Wellsville and vicinity)	None	Slightly Adverse	Slightly Adverse	Slightly Adverse	Slightly Adverse	Slightly Adverse	Slightly Adverse	Slightly Adverse
Remedial Personnel	None	Possibly Adverse	Possibly Adverse	Possibly Adverse	Possibly Adverse	Possibly Adverse	Possibly Adverse	Possibly Adverse
Local Plant and Wildlife	None	Adverse	Adverse	Adverse	Adverse	Adverse	Adverse	Adverse
Environment-at-Large	None	Slightly Adverse	Slightly Adverse	Slightly Adverse	Slightly Adverse	Slightly Adverse	Slightly Adverse	None
Long Term Impacts -								
Local Populace	Adverse	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Population-at-Large	Adverse	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Operating Personnel	None	Possibly Adverse	Possibly Adverse	None	None	None	None	None
Local Plant and Wildlife	Slightly Adverse	Adverse	Adverse	Adverse	Adverse	Adverse	Adverse	Adverse
Environment-at-Large	Adverse	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Local Land Use	Adverse	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial

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Good - Alternative is well suited to meeting criteria under consideration.
Fair - Alternative is suited to meeting criteria under consideration.
Poor - Alternative not well suited to meeting criteria under consideration.
Beneficial - Alternative effectively contributes to health and safety or environment.
Adverse - Alternative negatively impacts health and safety or environment.
High - Involves sophisticated mechanical equipment and logistical requirements.
Moderate - Involves commonly utilized mechanical equipment and logistical requirements.
Low - Little or no mechanical equipment required.

Table 20

MATRIX SUMMARY OF LANDFILL SITE REMEDIAL ALTERNATIVES

ALTERNATIVE	PUBLIC HEALTH CONCERNS	ENVIRONMENTAL CONCERNS	TECHNICAL CONCERNS
I. No Action	Continued exposure exists to rainfall-and flood-induced migration of contaminants.	Continued migration of contaminants to Genesee River. Not disruptive of existing pland and wildlife.	-
II. Slurry Walls RCRA Cap Full Channelization	Eliminates releases via all media. Public risk eliminated.	Eliminates releases to Genesee River. Highly disruptive of established plant and wildlife on Landfill Site.	Proven technology
III. Slurry Walls Surface Grading (Clay Cap) Partial Channelization	Eliminates releases via all media. Public risk eliminated.	Eliminates releases to Genesee River. Highly disruptive of established plant and wildlife on Landfill Site.	Proven technology
IV. RCRA Cap Full Channelization	Eliminates releases via surface runoff and bank erosion. Public risk minimized.	No groundwater controls Highly disruptive of established plant and wildlife on Landfill Site.	Proven technology
V. RCRA Cap Partial Channelization	Eliminates releases via surface runoff and bank erosion. Public risk minimized.	No groundwater controls Highly disruptive of established plant and wildlife on Landfill Site.	Proven technology
VI. Relocation of SLA to CELA; RCRA Cap on CELA; Partial channelization upto CELA	Eliminates releases via surface runoff and bank erosion. Public risk minimized.	Reduce the landfill site by about 2 acres; No groundwater controls. Highly disruptive of established plant and wildlife on Landfill Site.	Proven technology
VII. Surface Grading (Clay Cap) Partial Channelization	Controls releases via surface runoff and bank erosion. Public risk minimized.	No groundwater controls Highly disruptive of established plant and wildlife on Landfill Site.	Proven technology
VIII. Surface Grading (Clay Cap) Bank Stabilization (Dikes)	Controls releases via surface runoff and bank Risk of exposure exists during severe flood events	No groundwater controls No river flooding controls. Highly disruptive of established plant and wildlife on Landfill Site.	Proven technology

Table 21

SUMMARY OF ESTIMATED TOTAL PROJECT COSTS

ALTERNATIVE		CAPITAL COSTS	ANNUAL O&M COSTS OF	PRESENT WORTH OF O&M COSTS *	TOTAL PRESENT WORTH*
I	No Action	$ 90,000	$30,000	$394,000	$ 484,000
II	Slurry Walls RCRA Cap Full Channelization	$11,490,000	$40,000	$523,000	$12,013,000
III	Slurry Walls Clay Cap Partial Channelization	$10,703,000	$40,000	$523,000	$11,226,000
IV	RCRA Cap Full Channelization	$ 9,096,000	$30,000	$394,000	$ 9,490,000
V	RCRA Cap Partial Channelization	$ 8,506,000	$30,000	$394,000	$ 8,900,000
VI	Relocate SLA to CELA RCRA Cap, Partial Channelization	$ 8,759,000	$30,000	$394,000	$ 9,153,000
VII	Clay Cap Partial channelization	$ 8,309,000	$30,000	$394,000	$ 8,703,000
VIII	Clay Cap Bank Stabilization	$ 7,650,000	$30,000	$394,000	$ 8,044,000

* 20 year planning period, 10% discount rate
O&M is assumed to escalate approximately 5% per year over the length of the planning period.

Table 22

Due to concerns expressed, at this meeting, the NYSDOH performed a cancer study to determine whether there was an increased cancer risk from consuming the Village's water. The results of this study indicated that the overall cancer incidence in the Village for the studied period is essentially the same as that for other New York Villages having similar population densities.

After publicly releasing the draft Phase I RI, a public meeting was held on May 6, 1985. This meeting was attended by approximately 100 people. On April 1, 1985 a public workshop was held to answer additional questions, and to take comments. These meetings were announced via direct mailings and press releases. The public comment period ended on April 15, 1985.

After publicly releasing the draft FS for the landfill portion of the site, a September 3, 1985 meeting was held to brief the public on the findings and to solicit public comment. The meeting, which was announced via press release and direct mailing, was attended by 15 people. A three week public comment period ended on September 16, 1985.

A responsiveness summary is attached (see Attachment 1). This document summarizes the comments on the FS and includes meeting notification documents.

Consistency With Other Environmental Laws

The recommended remedial alternative complies with all substantive requirements of RCRA, the Clean Water Act, and the Clean Air Act. The alternative will also comply with all applicable COE permit requirements, as well.

Recommended Alternative

According to 40 CFR part 300.68(j), cost-effectiveness is described as the lowest cost alternative that is technically feasible and reliable and which effectively mitigates and minimizes damage to and provides adequate protection of public health, welfare, and the environment. Eight alternatives including no action were evaluated.

Alternative I, the no-action alternative, was found to provide inadequate protection of public health and the environment. The primary concerns associated with no action would be the continued discharge of contaminated surface runoff and leachate into the Genesee River, and the threat of failure of the landfill into the river.

Because there does not appear to be significant lateral movement of ground water through the waste matrix of the CELA and SLA, and because an adequate surface seal will significantly reduce infiltration and the resultant generation of leachate, slurry wall ground-water controls do not appear to be necessary to protect public health and the environment. Accordingly, both slurry wall alternatives, Alternative II and Alternative III, were deleted from consideration.

Partial river channelization eliminates the erosion and flood inundation threat to the landfill by providing stable riprap banks along both sides of the river along the full length of the landfill. The added protection provided by full river channelization's larger buffer between the river and the waste, and several hundred more footage of riprap upstream of the SLA is not significant enough to warrant the $500,000 increase in cost over partial river channelization. Accordingly, Alternative IV was deleted from consideration.

Alternative VIII, employing measures to protect the established channel, has only a fair potential for success because it would be vulnerable to uncontrolled Genesee River flood waters. For this reason this alternative was dropped from consideration.

The primary surface- and ground-water problems associated with the Landfill site are those due to runoff and infiltration. Accordingly, an adequate surface seal will be required to prevent further releases to the environment. Two surface seal alternatives were evaluated: RCRA capping, incorporating a 2-foot clay liner, 1-foot drainage layer, a geotextile filter fabric, 1.5 feet of soil and 0.5 feet of top soil and clay capping, utilizing 3 feet of clay, 1 foot of sandy soil, and 0.5 feet of top soil.

While clay capping will probably perform an adequate job of preventing surface runoff and infiltration, because of the thickness requirements of the clay cap so as to accommodate the 4-foot frost line, a RCRA cap would cost only $200,000 more than a clay cap. But for this insignificant increase in capital cost, a RCRA cap would allow significantly greater protection by providing a drainage layer and filter fabric. It would also require less long-term maintenance expenditures.

Because of the increased level of protection provide by a small increase in cost associated with RCRA capping, Alternative VII, employing a clay cap, was deleted from further consideration.

Because of the impervious nature of the soils underlying the CELA, the ground-water table beneath this portion of the Landfill site is depressed. The waste in the SLA, however, is considerably closer to the ground water because of the greater permeability of the underlying soils. As a result of the conditions at the SLA, a greater potential exists for releases to the ground water from the SLA than from the CELA. Relocation of the wastes in the SLA to the CELA under Alternative VI would, therefore, enhance the source control measure by providing an added degree of protection against releases to the ground water.

Under Alternative V (RCRA cap and partial channelization), the banks of the Genesee River would be channelized from the existing flood control structure north of the CELA to a point immediately south of the SLA. Under Alternative VI (relocation of the SLA to the CELA, RCRA cap, and partial river channelization), because the SLA would be excavated, the channelization would start from the borrow pit area south of the CELA, requiring significantly less riprap than the partial channelization provided by Alternative V. In addition, Alternative VI would require less cover material then Alternative V since the waste from the SLA would be consolidated on the CELA. As an added benefit of the decreased surface area requiring capping, Alternative VI would provide a slightly increased level of protection from surface runoff and infiltration as compared to the RCRA cap provided by Alternative V.

Under Alternative VI, excavation of the SLA and placement of clean fill would cost $1.5 million. However, under Alternative VI, the costs associated with less cover material and the abbreviated partial channelization requirements would require $1.25 million less than for Alternative V, making Alternative VI only $250,000 more expensive than Alternative V.

Since Alternative VI provides an increased level of protection from surface water infiltration and runoff as compared to Alternative V, and since the level of confidence associated with relocating the SLA is greater than leaving it in place, Alternative VI, relocating the SLA to the CELA,* RCRA cap, and partial river channelization is more cost-effective and is, therefore, recommended for implementation at the Landfill site.

The recommended remedial alternative consists of the following activities:

°Drums

To facilitate the necessary compaction and grading operation on the CELA, approximately 300 drums located on its surface will be removed and disposed of off-site.

Excavation

The 2.3-acre SLA will be excavated to a sufficient depth to remove all of waste material (approximately 20 feet). The excavated wastes will be placed on top of the cleared and grubbed CELA. Clean fill from an off-site source will be used to fill the excavated SLA.

---

* Consideration was given to on-site incineration of the excavated SLA wastes, however, because of the small quantity of material that will require incineration, it is not believed to be as cost-effective as relocation to the CELA.

Channelization

Approximately 2,000 linear feet (28 acres) of property along both banks of the Genesee River from the COE's sheet pile weir immediately downstream of the CELA to the borrow pit area will have to be cleared, grubbed, and graded. In addition, the impoundment located between the recently constructed dike and the exposed southern face of the CELA will have to be drained and filled. Excavation and on-site disposal of waste material may be required at the south end of the CELA and incidentally during excavation in the existing channel. A manufactured geotextile filter fabric will then be placed along both river banks, followed by a layer of sand to serve as a protective buffer, followed by riprap. The riprap will extend from the channel bottom to three feet above the 100-year flood elevation on the west side of the channel adjacent to the landfill for the entire length of the landfill-river interface. The rip rap on the eastern bank will extend from the channel bottom to the 100-year flood elevation. Figures 9 and 10 illustrate the proposed channelization.

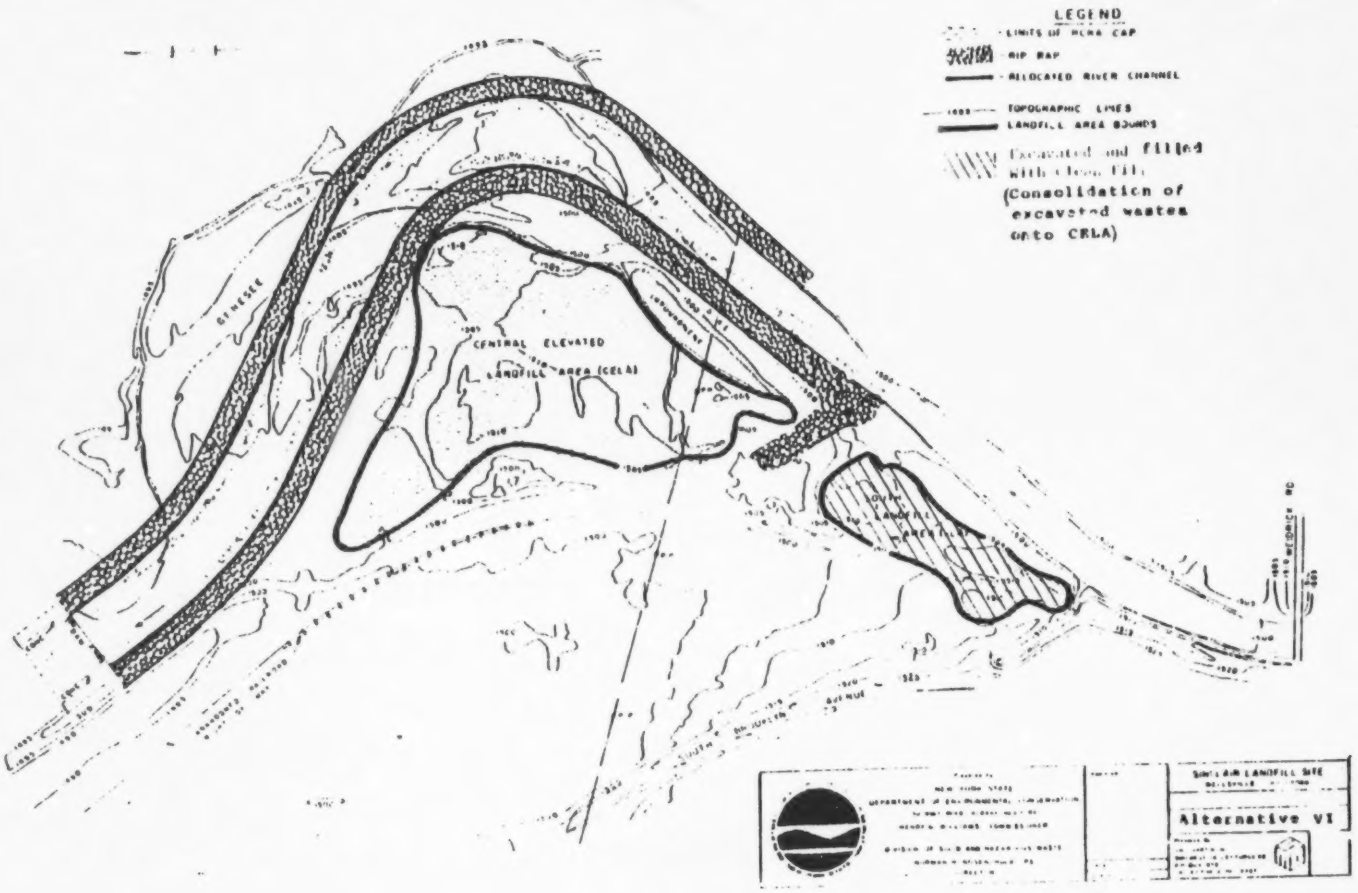
Surface Seal

Figure 11 shows the surface seal that will be installed following the removal of all exposed drums and vegetation, and the placement, compaction, and grading of the waste excavated from the SLA.

Approximately two feet of low permeability (maximum of 1 x 10 centimeters per second compacted clay would be applied across the entire CELA and SLA wastes. A one-foot drainage layer followed by a geotextile filter fabric would be placed on the clay layer. One foot of soil followed by 6 inches of seeded top soil will cover the top of the landfill.

A chain link fence, encompassing the entire Landfill site, will be installed to prevent access to the site.

Table 23 represents cost estimates for the recommended actions. The total required amount for the design ($500,000) and the construction ($8,759,000) of this measure is $9,259,000, of which EPA will fund $8,383,100.


LEGEND
LIMITS OF RCRA CAP
RIP RAP
RELOCATED RIVER CHANNEL
TOPOGRAPHIC LINES
LANDFILL AREA BOUNDS
Excavated and filled with clean fill
(Consolidation of excavated wastes onto CELA)
GENESEE
CENTRAL ELEVATED LANDFILL AREA (CELA)
AVENUE
NEW YORK STATE
SINCLAIR LANDFILL SITE
Alternative VI

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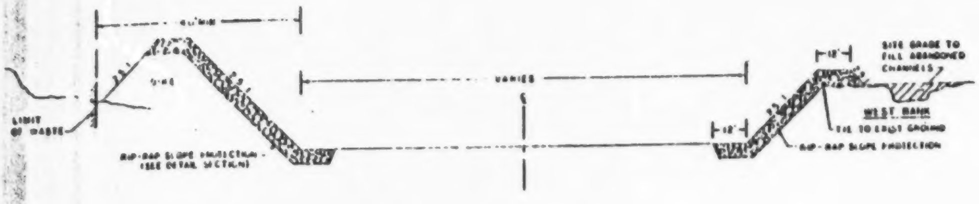
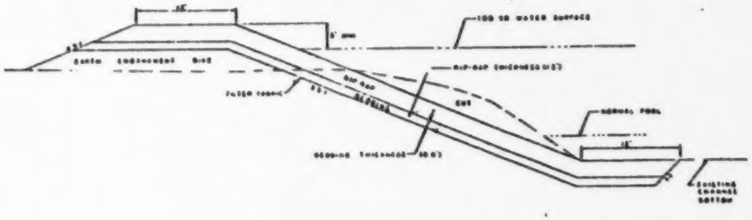
Relocation of SLA to CELA, RCRA cap, and partial river channelization

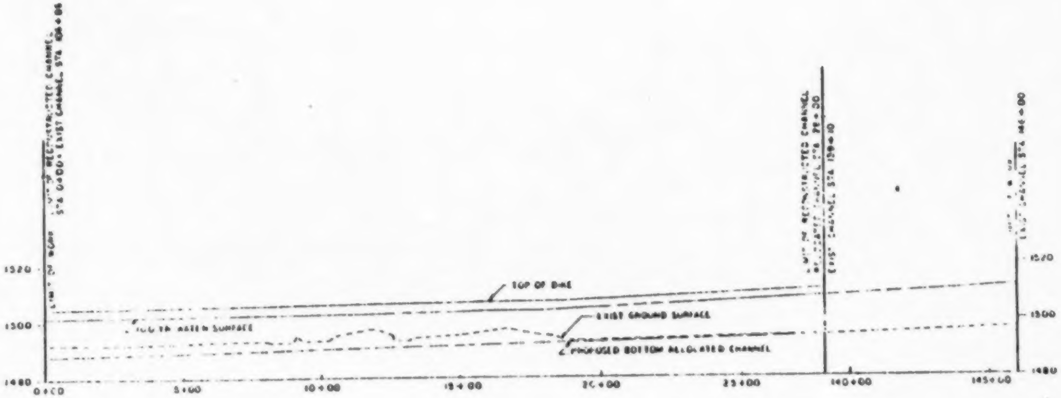
Figure 9


LIMIT OF WASTE
DIKE
2.5:1
VARIES
RIP-RAP SLOPE PROTECTION (SEE DETAIL SECTION)
12'
12'
SITE GRADE TO FILL ABANDONED CHANNELS
WEST BANK
TIE TO EXIST GROUND
RIP-RAP SLOPE PROTECTION

RECONSTRUCTED CHANNEL SECTION
NOT TO SCALE


16'
5' MIN
100 YR WATER SURFACE
2.5:1
EARTH EMBANKMENT DIKE
RIP-RAP THICKNESS
FILTER FABRIC
RIP-RAP
BEDDING
CUT
NORMAL POOL
BEDDING THICKNESS
EXISTING CHANNEL BOTTOM

RIPRAP SLOPE PROTECTION
NOT TO SCALE



RECONSTRUCTED CHANNEL PROFILE

SCALE HORIZ 1"=400'
VERT 1"=40'

TYPICAL DETAILS AND CHANNEL PROFILE

Prepared For:
NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
50 WOLF ROAD, ALBANY NEW YORK
HENRY G. WILLIAMS, COMMISSIONER

DIVISION OF SOLID AND HAZARDOUS WASTE
NORMAN H. NOSENCHUCK, P.E.
DIRECTOR

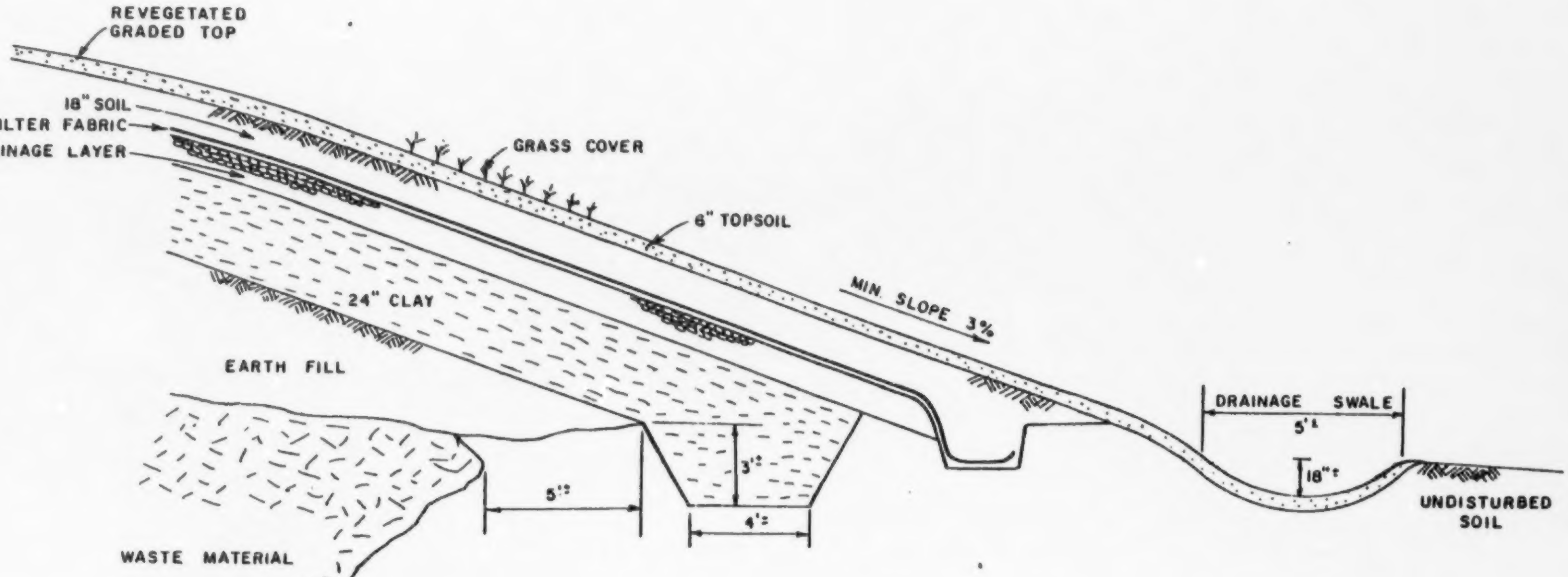
Approved:

DATE:
SCALE:

SINCLAIR LANDFILL SITE
WELLSVILLE NEW YORK

Figure 10

Prepared By:


REVEGETATED GRADED TOP
18" SOIL
GEOTEXTILE FILTER FABRIC
12" DRAINAGE LAYER
GRASS COVER
6" TOPSOIL
MIN. SLOPE 3%
24" CLAY
EARTH FILL
WASTE MATERIAL
5'±
3'±
4'±
DRAINAGE SWALE
5'±
18"±
UNDISTURBED SOIL

TYPICAL CROSS SECTION OF RCRA CAP

Prepared for
NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
50 WOLF ROAD ALBANY NEW YORK
HENRY G. WILLIAMS, COMMISSIONER

DIVISION OF SOLID AND HAZARDOUS WASTE
NORMAN H. NOSENCHUCK, P.E.
DIRECTOR

Approved

DATE

SCALE

SINCLAIR LANDFILL SITE
WELLSVILLE NEW YORK

Figure 11

Prepared By
[illegible]
900 WEST VALLEY FORGE RD
P.O. BOX 859
VALLEY FORGE, PA 19482

COST ESTIMATES
ALTERNATIVE VI
SLA RELOCATED TO CELA, RCRA CAP, PARTIAL RIVER CHANNELIZATION UPTO CELA

CAPITAL COSTS

	ELEMENT	CAPITAL COSTS
A.	Mobilization	$ 33,000
B.	Clearing and Grubbing	55,000
C.	Surficial Drum Removal and Disposal	40,000
D.	Filling and Grading (100,000 cy @ 9.50/cy)	950,000
E.	Drain and Fill Impoundment Behind Dike	380,000
F.	RCRA Cap (48,800 sy @ $26.20/sy)	1,278,000
G.	Fencing	60,000
H.	Partial River Channelization upto CELA	1,995,000
I.	Hazardous Waste Relocation from SLA to CELA	948,000
J.	Clean fill to backfill and level SLA	100,000
	Subtotal	$ 5,839,000
	Contingency (20%)	1,168,000
	Total Installed Cost(2)	$ 7,007,000
	Engineering, Administrative, Legal, etc. (25%)	1,752,000
	Total Capital Cost	$ 8,759,000

ANNUAL O&M COSTS

	ELEMENT	ANNUAL COSTS
A.	Monitoring Well Sampling and Analysis	$25,000
B.	Cap and Fence Maintenance	5,000
	Total Annual O&M	$30,000

Table 23

The Feasibility Study planned for the refinery portion of the Sinclair Refinery site is scheduled for completion in November 1986. So that implemention of the surface sealing recommended for the Landfill site will not preclude the Refinery site FS consideration of relocating contaminated soils from the Refinery site to the Landfill site, a phased approach will be employed in constructing the surface seal and channelization at the Landfill site. The Genesee River channelization design and construction, and the SLA excavation design and implementation will proceed as soon as possible. However, the CELA surface seal will not be designed until the Refinery site FS has considered all remedial alternatives, and a remedial solution has been selected. Should it be necessary, to protect the excavated SLA wastes and the CELA surface from erosion and surface runoff in the interim, a temporary 1-foot clay cover would be constructed.

Operation and Maintenance

Operation and maintenance requirements associated with this alternative are minimal ($30,000). The cap, river banks, and fence will require periodic attention and maintenance. Regular sampling and analysis of ground water from on-site and perimeter wells will be required, as well.

Schedule

Action	Date
-RA approves ROD	September 30, 1985
-Amend Cooperative Agreement for Design	September 30, 1985
-Solicit Design Proposals (State)	October 31, 1985
-Award Contract for Design (State)	January 31, 1985
-Start Design	April 1, 1986
-Complete Design	September 30, 1986
-Amend Cooperative Agreement for Construction	October 31, 1986
-Solicit Construction Proposals (State)	December 1, 1986
-Award Contract for Construction (State)	April 1, 1987
-Start Construction	May 1, 1987
-Complete Construction	May 31, 1989

Future Actions

Upon completion of the RI/FS for the refinery portion of the site, a Record of Decision will be prepared to recommend a remedial solution for this portion of the project.

The need for Landfill site ground-water control, and the incorporation of such control in the remedial measure for the refinery portion of the site, will be evaluated in detail during the FS for the Refinery site.

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233-0001

Henry G. Williams
Commissioner

March 22, 1985

Dear Concerned Citizen:

Work has been continuing on the Sinclair Refinery Superfund Site. The Phase I Remedial Investigation has been completed and the Draft Phase I Report has been distributed and copies have been placed in the projects Document Depository located in the Wellsville Public Library.

April 1, 1985

DISCUSSION OPPORTUNITY

1 - 4 PM and 6 - 9 PM
Wellsville Public Library

Please stop in anytime between 1 and 4 or 6 and 9 PM on April 1. Representatives from the Department of Environmental Conservation (DEC), SMC Martin, DEC's consultant and the Environmental Protection Agency (EPA) will be available to discuss the draft Phase I Report with you. They will explain any difficult to understand parts of the Report, answer your questions and take your comments.

The Phase I investigation studied soil types, water levels, weather and a variety of other factors that help to determine the extent of contamination and predict future contaminant movement. This Phase I study also included the analysis of a large number of soil, sediment, waste and water samples each of which has been analyzed for 145 different compounds. A large number of biological samples (fish, frogs, insects, mice, etc.) were also analyzed to determine if they showed any signs of contamination. The Report presents the results of the investigation, identifies the extent of migration of contaminants and documents the environmental impact of the site. The enclosed Executive Summary of the Draft Phase I Report provides a much more detailed description of what the Report includes. The complete Report consists of two volumes which have been placed in the Wellsville Library. We would like to gather your comments on the Report before it is finalized. THE COMMENT PERIOD ON THE PHASE I INVESTIGATION REPORT WILL END ON APRIL 15, 1985. We encourage you to write, call or give us your comments during our discussion sessions.

(OVER)

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May 6, 1985

PUBLIC MEETING

7:00 PM
Wellsville Public Library

ON MAY 6 WE WILL HOLD A PUBLIC MEETING TO PRESENT AND DISCUSS:

FAST TRACK FEASIBILITY STUDY - DRAFT REPORT

The Fast Track Feasibility Study is an investigation of Wellsville's public water supply and an evaluation of alternative methods of insuring that it is not contaminated by the Sinclair Refinery Site. The draft report will review the findings of the study, describe the alternatives that were looked at and recommend a remedial alternative.

HEALTH ASSESSMENT

The New York State Department of Health (DOH) has investigated the incidence of cancer in Wellsville as compared to other similar areas.

FUTURE REMEDIAL ACTIVITIES

Additional investigation and feasibility studies are in progress.

FINAL PHASE I INVESTIGATION REPORT

Following the close of the comment period on April 15, 1985 the Phase I Investigation Report will be finalized.

We look forward to meeting with you during both the discussions on the Draft Phase I Investigation Report (April 1, 1985) and the public meeting on the Fast Track Feasbility Study, Health Assessment, Future Remedial Activities, and the Final Phase I Investigation Report (May 6, 1985). Please let us know before the close of the comment period on April 15, 1985 if you have any questions or comments on the Draft Phase I Investigation Report but are unable to participate in the discussion sessions. We have a toll-free telephone number - 1-800-342-9296 or contact Dr. Vasudevan at 518/457-4343.

Sincerely,

Bruce Bentley
Citizen Participation Specialist

Enc.

STATE OF NEW YORK
DEPARTMENT OF HEALTH OFFICE OF PUBLIC HEALTH
CORNING TOWER • THE GOVERNOR NELSON A. ROCKEFELLER EMPIRE STATE PLAZA • ALBANY, N.Y. 12201
DAVID AXELROD, M.D.
Commissioner
LINDA A. RANDOLPH, M.D., M.P.H.
Director
WILLIAM F. LEAVY
Executive Deputy Director

April 29, 1985

Dear Concerned Citizen:

The Cancer Surveillance Program in the Bureau of Cancer Epidemiology has completed the investigation of cancer incidence in Wellsville which you requested. The complete report is attached.

In summary, overall cancer incidence in the Village of Wellsville for 1973-1982 is essentially the same as the rate for other minor civil divisions in New York State (exclusive of New York City) having a similar population density. In published studies of drinking water and cancer, the cancer sites usually associated with exposure to trihalomethanes (chemicals formed during water chlorination such as chloroform) or polychlorinated biphenyls (PCBs) are colon, rectum, bladder, liver and malignant melanoma of the skin. None of these sites were found to be significantly increased in Wellsville. The small deviations seen between the observed number of people with cancer and the number expected based on the population standard rates are within the range which occur by chance when comparing a single community with a large population. Thus, the pattern of cancer occurrence in Wellsville does not support the hypothesis of an association with chemicals in the public drinking water. This conclusion is consistent with the results of the water quality testing, which showed the levels of trihalomethanes to be well below the maximum contaminant level considered acceptable for protection of the public health. No PCB's were detected in the samples.

There was an excess of leukemia cases in Wellsville men which exceeded the limits expected by chance, that is, it was statistically significant. However, the lack of an excess of leukemia in women and the absence of childhood cases make an association with drinking water very unlikely. This pattern is more suggestive of an occupational or lifestyle exposure which puts men at an increased risk. Six of the ten men with leukemia had worked in occupations with a potential exposure to leukemogenic agents such as benzene, petroleum products and organic solvents. However, only two of these six men had acute myeloid leukemia, the type which is usually associated with occupational benzene exposure, and there was no increase in aplastic anemia deaths, a precursor condition of acute myeloid leukemia. The sampling results on Wellsville's water supply through December 1984 indicate that on one occasion benzene was detected in treated water at a level above the Department of Health's guideline. It was not detected at other sampling times. The resulting low average level of benzene in Wellsville's drinking water contributes only a negligible amount to the total daily intake from all sources of benzene exposure. It is unlikely that exposure to these low levels of benzene in the drinking water accounts for the excess cases of leukemia in Wellsville men.

The State Health Department has already begun further study of leukemia in Wellsville. An interview study of the leukemia patients and their families to obtain more detailed information on occupational history as well as other leukemia risk factors, such as exposure to radiation and family history of cancer, will be conducted.

Sincerely yours,

Susan J. Standfast, MD

Susan J. Standfast, M.D.
Assistant to the Director
Division of Epidemiology

SINCLAIR REFINERY SITE
WELLSVILLE, NEW YORK
PUBLIC INFORMATION MEETING

MAY 6, 1985

AGENDA

1-	Introduction	By:	Mr. John W. Willson, NYSDEC
2-	Phase I Remedial Investigation	By:	Mr. Daniel E. Erdman, SMC Martin, Inc.
3-	Investigation of Cancer Incidence in Wellsville, New York	By:	Dr. Susan Standfast, NYSDOH
4-	Fast-Track Feasibility Study of the Wellsville Water Supply	By:	Mr. Stuart Rosenthal, SMC Martin, Inc.
5-	Federal Superfund Procedure	By:	Mr. George Pavlou, USEPA
6-	Future Remedial Activities at Sinclair Refinery Site	By:	Dr. Chittibabu Vasudevan, NYSDEC

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233-0001

Henry G. Williams
Commissioner

AUG 2 6 1985

Dear Concerned Citizen:

RE: Draft Report On Feasibility Study for
The Sinclair Landfill Site,
Village of Wellsville, Allegany County

Enclosed is a copy of the Executive Summary of the Draft Report on the Feasibility Study for the Sinclair Landfill Site. Copies of the report are available at the document depository in the Wellsville Public Library located at 155 N. Main Street, Wellsville, New York.

There will be a Public Information Meeting concerning the report on Tuesday, September 3, 1985, 7:00 p.m. at the Wellsville Public Library, 155 N. Main Street, Wellsville, New York. Representatives of the New York State Department of Environmental Conservation (NYSDEC), SMC Martin, Inc., the Department's consultant, and the United States Environmental Protection Agency (EPA) will be available to discuss the report and to receive and answer comments.

Please submit your comments on the draft report to me at the above address on or before September 16, 1985. All comments received before the September 16, 1985 close of business will be addressed in the responsiveness summary report.

The EPA will prepare a Record of Decision (ROD) in connection with the subject matter which will review: the draft report, the comments received on or before September 16, 1985, and the responsiveness summary report which will be prepared by NYSDEC. The ROD will explain the selection of the Remedial Measure for the Sinclair Landfill Site.

If you have any questions on this matter, please contact me at 518/457-4343 or leave a recorded message for Dr. Vasudevan by calling our toll free telephone number 1-800-342-9296.

Sincerely,

Chittibabu Vasudevan, Ph.D., P.E.
Project Engineer
Bureau of Western Remedial Action
Division of Solid and Hazardous Waste

Enclosure

G. Pavlou

SEP 26 1985

THIS LETTER WAS SENT TO THE ATTACHED LIST

Dear:

Re: Sinclair Refinery Site, Wellsville, Allegany County
Responsiveness Summary on Feasibility Study for the
Sinclair Landfill Site.

Enclosed is a copy of the summary of the Responsiveness Summary Report addressing comments received from the public on the Draft Report on Feasibility Study for the Sinclair Landfill Site. Additional Copies of the Responsiveness Summary Report are available at the document depository in the Wellsville Public Library located at 155 North Main Street, Wellsville, New York.

The United States Environmental Protection Agency (USEPA) is expected to write the Record of Decision (ROD) by September 30, 1985. The ROD will explain the selection of Remedial Measures for the Sinclair Landfill Site.

If you have any questions on these matters, please contact Chittibabu Vasudevan, Ph.D., P.E., of my staff, at (518) 457-4343 or leave a recorded message for Dr. Vasudevan by calling our toll free number, 1-800-342-9296.

Sincerely,

Norman H. Nosenchuck, P.E.
Director
Division of Solid and Hazardous Waste

Enclosure

cc: G. Pavlou, USEPA, Region II, w/enc. ✓
J. Singerman, USEPA, Region II, w/enc.
N. Kim, NYSDOH, Albany, w/enc.
L. Voilanti, NYSDOH, Buffalo, w/enc.
G. Johnson, NYSDOL, New York, w/enc.
S. Rosenthal, SMC Martin, w/enc.

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PUBLICATION

Division of Solid and Hazardous Waste

RESPONSIVENESS SUMMARY

Responses to Public Comments on Draft Report "Feasibility Study for the Sinclair Refinery Site-Landfill, Wellsville, New York"

September 1985

New York State Department of Environmental Conservation

RESPONSIVENESS SUMMARY

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-- Mr. Arthur F. Pope, Atlantic Richfield Company	25

INTRODUCTION TO THE PROBLEM

The Village of Wellsville is situated along the Genesee River at its confluence with Dyke Creek, Allegany County, in the southwestern portion of New York State. The former Sinclair Refinery, now an uncontrolled hazardous waste site, consists of 90-acres plus a 12-acre landfill located along the west bank of the Genesee River approximately one mile upstream from Wellsville.

The Genesee River is the primary drinking water source for the Village of Wellsville. The water supply intake for the Wellsville Water Treatment Plant is located approximately one-quarter (¼) mile downstream from the northernmost edge of the Sinclair Refinery Site. The water supply system serves approximately 6,000 people, producing approximately one (1) million gallons per day (MGD).

In recent years, complaints of oily tastes and odor in the drinking water have occasionally been reported by Wellsville residents, although records of such complaints have not been kept. These complaints, along with visible bank erosion of the landfill, particularly during heavy rains in October of 1981, brought the Sinclair Site to public recognition as a potential source of contamination to the Village's drinking water.

In view of the threat of exposure created by the Wellsville water intake's close proximity downstream of the Sinclair Site, the New York State Department of Environmental Conservation (NYSDEC), in January 1985, authorized their consultant, SMC Martin, to prepare a fast-track feasibility study of feasible Initial Remedial Measures (IRM), in accordance with NCP guidelines and the IRM Report was distributed in May 1985.

The NYSDEC received comments from elected officials, representatives of the Village of Wellsville, interested citizens and the Atlantic Richfield Company (ARCO). Most of the comments were related to the relocation of the water intake or continuous operation of the granular activated carbon units. Comments and responses were presented in a Responsiveness Summary Report, August 1985. The Environmental Protection Agency (EPA) staff informed the public at the September 3, 1985 Public Meeting that relocation of the intake to a location upstream of the Landfill Site is recommended as an Interim Remedial Measure for the Wellsville Water Supply, to the EPA's Regional Administrator.

In 1984 and 1985, a Remedial Investigation was conducted in accordance with National Contingency Plan guidelines, in order to determine the nature and extent of the environmental contamination. A Draft Remedial Investigation Report was published in March 1985. Additional investigative work continued in 1985.

The Remedial Investigation identified several factors of importance to the consideration of remedial measures:

1- A clay unit, 35 to 60 feet thick, underlies the Landfill Site at a depth generally less than 25 feet from the ground surface.

2- Contaminants present in the greatest quantities in the landfill areas include priority and non-priority volatile organics, base/neutral extractable organics and metals.

3- Although wastes and soils show significant quantities of specific contaminants, ground and surface waters beneath the Landfill Site remain relatively uncontaminated. A pathway of significant contaminant migration between the waste/soil and the groundwater does not appear to exist.

4- Contamination in river sediments downstream (north) of the Landfill Site is comparable to contamination at a sampling location upstream.

5- A potential pathway of contaminant migration exists between flood-induced landfill bank erosion and overland storm runoff and contaminant discharges to the Genesee River.

6- Approximately 300 drums of waste material lie in various stages of decomposition on the surface of the Landfill Site. Chemical analyses of the samples taken from the waste drums indicate that very few contaminants were present in the drummed material.

7- The CELA was calculated to contain approximately 206,500 cubic yards (cy) (248,000 tons) of waste and the SLA was calculated to contain approximately 22,500 (cy) (27,000 tons). Maximum waste thicknesses measured were 20 feet in the CELA and 18 feet in the SLA.

8- A leachate generation model predicted that leachate migrating from the CELA (vertical and lateral) would be negligible and leachate migrating from the SLA would total approximately 1,700 gallons/day.

Additional Remedial Investigation (RI) is in progress at the refinery portion of the Sinclair Site. Application to EPA was submitted in September 1985 requesting additional funding to complete the investigation at the refinery. After the completion of the investigation at the refinery, if it is demonstrated that the refinery portion is contaminated, a Feasibility Study (FS) will be conducted to evaluate remedial technologies to identify cost-effective remedial measure(s) for the refinery portion of the Sinclair Site. The progress of the RI/FS for the refinery portion depends on the funding availability.

SUMMARY

In accordance with the National Contingency Plan (NCP), the Feasibility Study for the landfill portion of the Sinclair Refinery Site evaluated several remedial technologies to provide a cost-effective Remedial Measure for the central elevated and southern landfill sites.

Remedial response criteria for the Landfill-Site were developed for ground and surface waters and surface and subsurface soils. Water criteria coincide with criteria for raw drinking water supplies as established by the New York State Department of Health. Soils criteria were derived from background soil concentration levels or a partition coefficient analysis.

Thirty remedial technologies were considered and screened as to their technical feasibility, environmental/public health effects and order-of-magnitude costs. These technologies were either source control measures or migration management measures, as listed on Table 1.

The technology screening resulted in the rejection of groundwater/leachate control, on-site treatment and river sediment removal as either not technically feasible or resulting in insignificant benefits. Technologies such as runoff collection and groundwater recovery were rejected because their costs were generally 3-10 times greater than other technologies that achieved comparable public health and environmental benefits. Those technologies that survived the screening process are listed in Table 2.

The most promising remedial technologies were formulated into remedial action alternatives in accordance with the United States Environmental Protection Agency's (USEPA) policy. This policy specifies that alternatives considered should cover a spectrum ranging from No Action to those minimizing threats but not attaining all relevant standards, those attaining relevant standards, and those exceeding relevant standards. Following a Public Meeting on September 3, 1985, three (3) additional alternatives were developed and evaluated. These three (3) alternatives are briefly described in Table 3. Table 4 lists the alternatives utilizing the available remedial technologies in response to this policy.

A detailed evaluation of these alternatives was carried out based on a non-cost and cost basis. Non-cost criteria included reliability, operational complexity, short and long-term health and safety impacts, short and long-term environmental impacts, feasibility to site specific conditions, and implementation time. The non-cost decision matrix for landfill site remedial alternatives is presented in Table 5. The non-cost evaluation indicated that all alternatives, except No Action, would have adverse short-term impacts on the local population and plant and wildlife due to the extensive construction requirements and the associated traffic, noise, dust and destruction of habitants. Conversely, all alternatives (except No Action) would have beneficial long-term impacts on the local population and environment, with the exception of plant and wildlife on the Landfill Site itself. Differences among alternatives were strictly a matter of degree.

The non-cost analysis indicated a wider disparity among alternatives for technical criteria than for environmental criteria. Again with the exception of No Action, alternatives were well suited for application to the Landfill Site. Based on the evaluation of alternatives performed by SMC Martin, Inc., Consultant to the New York State Department of Environmental Conservation, Alternative No. II, appears to have the highest potential for success, with Alternatives No. III and IV close behind. (Cost criteria included capital (installed) cost, annual operation and maintenance cost and present worth). All had low operational requirements, although those requiring water level maintenance within slurry walls (Nos. II and III), and that requiring dike maintenance (No. V), having marginally higer needs. Implementation times varied from a low of 18-24 months for Alternative No. V to 30-36 months for Alternative No. II.

Because of the extremely low operating and maintenance costs associated with all alternatives, this item was not a significant factor in the cost analysis. Capital costs varied from just $90,000 for No Action (fence), to $7,650,000 for the next most expensive alternative (No. V), to $11,490,000 for the most expensive alternative (No. II). Table 6 summarizes both the non-cost and cost analysis.

The NYSDEC has analyzed all alternatives in detail. The NYSDEC is recommending the selection of Alternative VIII - Relocation of SLA to the CELA, RCRA Cap and Partial Channelization upto the CELA for the following reasons:

- The NYSDEC feels that Partial Channelization provides stable adequate rip-rap banks along both sides and eliminates the threats of landfill erosion and flood inundation.

- Relocation of the contents of the SLA to CELA and filling and regrading SLA with clean fill would enhance the source control measure by reducing the landfill area.
- Relocation of the contents of the SLA to CELA eliminates/reduces leachate generation currently calculated to be 1,700 gallons per day.
- Relocation of the contents of the SLA to CELA provides a greater distance of separation between the SLA wastes and the groundwater. Also, the soil beneath the CELA is less pervious than the soil beneath the SLA, adding better protection against migration of SLA contaminants to the groundwater.
- The RCRA Cap, which incorporates clay liner, geofabric and drainage layer for leak detection, is designed to minimize infiltration of rain water and snow melt into the landfills.

Because there does not appear to be significant lateral movement of groundwater through the waste matrix of the CELA and SLA at this time and because an adequate surface seal will significantly reduce infiltration and the resultant generation of leachate, groundwater control may not significantly improve the protection to the public health and the environment provided by the recommended alternative. However, during the Feasibility Study for the refinery portion of the Sinclair Site, the need for groundwater control will be studied in more detail. If such need is demonstrated, a cost-effective groundwater control at the Landfill Site will be considered as a remedial measure. This alternative poses greater short-term risk of contaminated dust exposure to on-site personnel and local population than other alternatives. However, with proper health and safety measures during the construction, the short-term risk to the on-site personnel and the population in the immediate vicinity will be minimized.

It is expected that the EPA will write a Record of Decision selecting a cost-effective remedy for the Landfill Site by September 30, 1985. The public will be notified of the selection of the remedy after it is made by the EPA.

TABLE 1

SUMMARY OF AVAILABLE REMEDIAL TECHNOLOGIES

A. SOURCE CONTROL MEASURES

- a. No action
- b. Collection of contaminated surface runoff
  - 1. on-site treatment
  - 2. treatment at publicly-owned treatment works (POTW)
- c. Collection of leachate
  - 1. on-site treatment
  - 2. treatment at publicly-owned treatment works (POTW)
- d. Excavation and disposal
  - 1. off-site
  - 2. on-site secure landfill
  - 3. incineration and on-site disposal
  - 4. solidification and on-site disposal
  - 5. biological destruction and on-site disposal
- e. In-situ treatment of wastes
  - 1. solidification
  - 2. biological destruction
- f. Installation of impermeable barriers
  - 1. surface grading and revegetation
  - 2. slurry walls
  - 3. surface cap
  - 4. complete encapsulation
- g. Landfill bank stabilization

B. OFF-SITE (MIGRATION MANAGEMENT) CONTROL MEASURES

- a. No action
- b. Ground-water barriers
  - 1. slurry walls
  - 2. pumping
- c. Ground-water recovery
  - 1. on-site treatment
  - 2. treatment at publicly-owned treatment works (POTW)
- d. Dredging of contaminated river sediments
  - 1. on-site disposal
  - 2. off-site disposal
- e. River flow control (flood protection)
  - 1. open channels
  - 2. dikes

TABLE 2

TECHNOLOGIES SURVIVING INITIAL SCREENING

A. SOURCE CONTROL MEASURES

A.a	No action
A.f.1(a)	Surface grading and revegetation, CELA and SLA
A.f.2(a)	Installation of perimeter slurry walls, CELA and SLA
A.f.3(a)	Installation of RCRA surface cap, CELA and SLA
A.f.3(b)	Installation of RCRA surface cap, SLA relocated CELA
A.g.1	Landfill bank stabilization with modified slopes

B. MIGRATION MANAGEMENT CONTROL MEASURES

B.a	No action
B.e.1	River flow control with open channels
B.e.2	River flow control with dikes

TABLE 3

ADDITIONAL ALTERNATIVES - VII, VIII, IX

Alternative VII - RCRA Cap, Partial River Channelization

This alternative combines a source control measure with a migration management technology to produce a system attaining applicable public health/environmental criteria. This alternative provides a clay liner, geofabric, and leak detection layed on the surface of the Central Elevated Landfill Area (CELA) and the Southern Landfill Area (SLA).

The other feature of this alternative is the partial channelization of the Genesee River from a point roughly opposite the southern tip of the SLA to the existing flood control structures below the northern tip of the landfill site. This feature widens the river in two stages and moves the river channel away from the landfill site. For a schematic description of this river channelization, please refer to Figure 3-12 and Appendix C-3-3 of the Feasibility Study report, dated August 1985.

Alternative VIII - Relocation of SLA to CELA, RCRA Cap the CELA, Partial River Channelization

NYS DEC IS RECOMMENDING THIS ALTERNATIVE. Like alternative VII, this alternative combines a source control measure with a migration management technology, producing a system attaining applicable public health/environmental criteria. The contents of the SLA would be excavated and placed on top of the contents of the CELA. The area of the SLA would be filled and regraded with clean fill from off-site. The surface of the combined landfill in the CELA would be graded, covered with a RCRA cap and revegetated. The RCRA cap would be of the same characteristics as for alternative VII (clay liner, geofabric, and leak detection).

The other feature of this alternative is the partial channelization of the Genesee River from the borrow pit area (south of the CELA) to the existing flood control structures below the northern tip of the landfill site. As in the case of Alternative VII, this feature widens the river and moves the river channel away from the landfill site. For schematic description of this river channelization, please refer to Figure 3-12 and Appendix C-3-3 of the Feasibility Study report dated August 1985.

Alternative IX - Relocation of SLA to CELA, RCRA Cap, the CELA, Full Channelization

This alternative combines a source control measure with a migration management technology, producing a system attaining applicable public health/environmental criteria. The source control measure is identical to that for Alternative VII; excavation and placement of the contents of the SLA on top of the CELA, filling the SLA with clean fill material and capping the CELA with a RCRA cap and revegetation.

However, the migration management technology, for this alternative, Full Channelization is more redundant than Partial Channelization. As opposed to Partial Channelization, Full Channelization maintains a uniform width of 160 feet from the borrow pit area (south of CELA) to the existing flood structures below the northern tip of the landfill site. As in the case of other two Alternatives (VII, VIII), this feature moves the river channel away from the landfill site. For schematic description of this river work, please refer to Figure 3-1 and Appendix C-3-2 of the Feasibility Study report dated August 1985.

TABLE 4

REMEDIAL ACTION ALTERNATIVES

Alternative Number	USEPA Policy Reference	Component Technologies	
I	No Action	A.a	No Action
		B.a	No Action
II	Alternative exceeding applicable public health/environmental criteria	A.f.2(a)	Installation of perimeter slurry walls, CELA and SLA
		A.f.3(a)	Installation of RCRA surface cap, CELA and SLA
		B.e.1	River flow control with open channels (full channelization)
III	Alternative attaining applicable public health/environmental criteria	A.f.1(a)	Surface grading and revegetation (includes clay cap), CELA and SLA
		A.f.2(a)	Installation of perimeter slurry walls, CELA and SLA
		B.e.2	River flow control with dikes (partial channelization)
IV	Alternative attaining applicable public health/environmental criteria	A.f.3(a)	Installation of RCRA surface cap, CELA and SLA
		B.e.1	River flow control with open channels (full channelization)
V	Alternative minimizing contaminant migration and protecting public health/environment but not attaining applicable criteria	A.f.1(a)	Surface grading and revegetation (includes clay cap), CELA and SLA
		A.g.1	Landfill bank stabilization with modified slopes
VI	Alternative minimizing contaminant migration and protecting public health/environment but not attaining applicable criteria	A.f.1(a)	Surface grading and revegetation (includes clay cap), CELA and SLA
		B.e.2	River flow control with dikes (partial channelization)

TABLE 4 (CONTINUED)

REMEDIAL ACTION ALTERNATIVES

Alternative Number	USEPA Policy Reference		Component Technologies
VII	Alternative attaining applicable public health/environmental criteria	A.f.3(a)	Installation of RCRA surface cap, CELA and SLA
		B.e.2	River flow control with open Channels (partial channelization)
VIII	Alternative attaining applicable public health/environmental criteria	A.f.3(b)	Installation of RCRA surface cap, SLA relocated to CELA
		B.e.2	River flow control with open channels (partial channelization)
IX	Alternative attaining applicable public health/environmental criteria	A.f.3(b)	Installation of RCRA surface cap, SLA relocated to CELA
		B.e.1	River flow control with open channels (full channelization)

TABLE 5

NON COST DECISION MATRIX FOR LANDFILL SITE REMEDIAL ALTERNATIVES

CRITERIA	I	II	III	IV	V	VI	VII	VIII&IX
Technical:								
Feasibility to Site-Specific Conditions	Good	Good	Good	Good	Good	Good	Good	Good
Reliability -								
Potential for success (Level of Confidence)	Poor	Good	Fair/Good	Fair/Good	Fair	Fair	Fair/Good	Fair/Good
Demonstrated performance in similar applications	Poor	Good	Good	Good	Fair/Good	Good	Good	Good
Operational Requirements	Low	Low/Moderate	Low/Moderate	Low	Low/Moderate	Low	Low	Low
Implementation Time (months) -								
Design/Construction	4-6	30-36	24-30	30-36	18-24	24-30	24-30	24-30
Achievement of Beneficial Results	4-6	30-26	24-30	30-36	18-24	24-30	24-30	24-30
Environment and Public Health:								
Short Term Impacts (construction related) -								
Local Populace (immediately around site)	None	Adverse	Adverse	Adverse	Slightly Adverse	Adverse	Adverse	Adverse
Population-at-Large (Wellsville and vicinity)	None	Slightly Adverse	Slightly Adverse	Slightly Adverse	Slightly Adverse	Slightly Adverse	Slightly Adverse	Slightly Adverse
Remedial Personnel	None	Possibly Adverse	Possibly Adverse	Possibly Adverse	Possibly Adverse	Possibly Adverse	Possibly Adverse	Possibly Adverse
Local Plant and Wildlife	None	Adverse	Adverse	Adverse	Adverse	Adverse	Adverse	Adverse
Environment-at-Large	None	Slightly Adverse	Slightly Adverse	Slightly Adverse	None	Slightly Adverse	Slightly Adverse	Slightly Adverse
Long Term Impacts -								
Local Populace	Adverse	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Population-at-Large	Adverse	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Operating Personnel	None	Possibly Adverse	Possibly Adverse	None	None	None	None	None
Local Plant and Wildlife	Slightly Adverse	Adverse	Adverse	Adverse	Adverse	Adverse	Adverse	Adverse
Environment-at-Large	Adverse	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Local Land Use	Adverse	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial

Good - Alternative is well suited to meeting criteria under consideration.
Fair - Alternative is suited to meeting criteria under consideration.
Poor - Alternative not well suited to meeting criteria under consideration.
Beneficial - Alternative effectively contributes to health and safety or environment.
Adverse - Alternative negatively impacts health and safety or environment.
High - Involves sophisticated mechanical equipment and logistical requirements.
Moderate - Involves commonly utilized mechanical equipment and logistical requirements.
Low - Little or no mechanical equipment required.

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TABLE 6

MATRIX SUMMARY OF LANDFILL SITE REMEDIAL ALTERNATIVES

ALTERNATIVE	COST ($1,000) CAPITAL	PRESENT WORTH	PUBLIC HEALTH CONCERNS	ENVIRONMENTAL CONCERNS	TECHNICAL CONCERNS	OTHER COMMENTS
I. No Action	90	484	Continued exposure exists to rainfall-and flood-induced migration of contaminants.	Continued migration of contaminants to Genesee River. Not disruptive of existing pland and wildlife.	-	Lowest cost alternative.
II. Slurry Walls RCRA Cap Full Channelization	11,490	12,013	Eliminates releases via all media. Public risk eliminated.	Eliminates releases to Genesee River. Highly disruptive of established plant and wildlife on Landfill Site.	Proven technology	Highest cost alternative. Greatest public health benefits.
III. Slurry Walls Surface Grading (Clay Cap) Partial Channelization	10,703	11,226	Eliminates releases via all media. Public risk eliminated.	Eliminates releases to Genesee River. Highly disruptive of established plant and wildlife on Landfill Site.	Proven technology	Slightly lower level of confidence than Alternative No. II.
IV. RCRA Cap Full Channelization	9,096	9,490	Eliminates releases via surface runoff and bank erosion. Public risk minimized.	No groundwater controls Highly disruptive of established plant and wildlife on Landfill Site.	Proven technology	Good application in view of lack of groundwater contaminant migration.
V. Surface Grading (Clay Cap) Bank Stabilization (Dikes)	7,650	8,044	Controls releases via surface runoff and bank Risk of exposure exists during severe flood events	No groundwater controls No river flooding controls. Highly disruptive of established plant and wildlife on Landfill Site.	Proven technology	Lowest cost and lowest level of confidence of all capping/channelization alternatives.
VI. Surface Grading (Clay Cap) Partial Channelization	8,309	8,703	Controls releases via surface runoff and bank erosion. Public risk minimized.	No groundwater controls Highly disruptive of established plant and wildlife on Landfill Site.	Proven technology	Comparable to Alternative No. IV with lower level of confidence.
VII. RCRA Cap Partial Channelization	8,506	8,900	Eliminates releases via surface runoff and bank erosion. Public risk minimized.	No groundwater controls Highly disruptive of established plant and wildlife on Landfill Site.	Proven technology	Slightly lower level of confidence than Alternative No. IV.
VIII. Relocation of SLA to CELA; RCRA Cap on CELA; Partial channelization upto CELA	8,759	9,153	Eliminates releases via surface runoff and bank erosion. Public risk minimized.	Reduce the landfill site by about 2 acres; No groundwater controls. Highly disruptive of established plant and wildlife on Landfill Site.	Proven technology	Slightly higher level of confidence than Alternative No. VII.
IX. Relocation of SLA to CELA;RCRA Cap on CELA;Full channelization upto CELA	9,254	9,648	Eliminates relaeses via surface runoff and bank erosion. Public risk minimized.	Reduce the landfill site by about 2 acres. No groundwater controls. Highly disruptive of established plant and wildlife on Landfill Site.	Proven technology	Slightly higher level of confidence than Alternative No. VIII.

RESPONSES TO PUBLIC COMMENTS

ON

FEASIBILITY STUDY FOR SINCLAIR LANDFILL SITE

WELLSVILLE, NEW YORK

1. Comment: Who will be responsible for monitoring and maintaining the remedial structures (RCRA cap, rip-rap, channels, etc.)?

   Response: During the first year after the remedial measures' implementation 90 percent (90%) of the maintenance and monitoring costs will be borne by the EPA and 10 percent (10%) by the NYSDEC. After the first year, long-term monitoring and maintenance costs will be borne by the State of New York or some other responsible entity capable of performing this work and bearing these costs.

2. Comment: What additional sampling is planned?

   Response: Additional sampling at the Refinery, off-site tank farm and upstream of the site for background characterization are planned. The sampling includes surface water, groundwater and surface and subsurface soil. The work will begin immediately after funding becomes available.

3. Comment: What is the landfill? Who was responsible for the materials placed on the landfill?

Response: At the Sinclair Site, the southernmost portion of the property was used as a waste dump for a variety of materials. Landfill activities occurred throughout operational history of the refinery, spanning greater than 58 years. The larger landfilled area (9.2-acres) is referred to a the Central Elevated Landfill Area (CELA) and the area to the south (2.3-acres) is called the South Landfill Area (SLA). These two (2) landfill areas are seperated by an area reportedly used as a borrow source. Landfill activities apparently continued long after the closure of refinery operations. Aerial photographic evidence from 1964, 1970, 1974 and 1982 indicated that lagoon dredging, trench backfilling, additional landfilling, and general regrading occurred throughout this period. Additional landfilling appears to be most extensive in the south landfill area between the years 1970 and 1974.

4. Comment: How many chemicals were detected and at what concentration levels?

Response: There were 62 chemicals identified at the Landfill Site in waste, surface soil, subsurface soil, groundwater or surface water. For complete list and concentrations at which they were found, please refer to Tables 1-3 to 1-5 of the Feasibility Study Report, dated August 1985.

5. Comment: Were the same chemicals found at the landfill as at the Refinery Site?

Response: The Remedial Investigation at the refinery portion of the site is not complete. However, based on the information available at this time, most of the chemicals found at the Landfill Site were also detected at the refinery.

6. Comment: How far upstream were water samples taken? Was contamination found?

Response: Limited upstream water samples were taken in the vicinity of Weidric Bridge, about one-half mile upstream of the Landfill Site. Analyses of these limited water samples, indicate presence of no contaminants other than phenol. It is likely that abandoned oil wellfields upstream may be source(s) of the phenol. Additional background and upstream sampling are planned.

7. Comment: Is public access to the river bank by the landfill restricted?

Response: Public access through the landfill to the river bank is restricted by a fence. However, the river bank may be accessed through the Genesee River.

8. Comment: Why were only six (6) alternatives developed and evaluated while it is possible to develop more alternatives?

Response: Three (3) additional alternatives were developed and evaluated. Please refer to summary of the Responsiveness Report for details.

9. Comment: The surface soil was not considered as a pathway of contamination.

Response: As reported on Page 1-45 and 1-46, the concentrations of several chemicals are excessively high in samples collected from exposed waste drums and in soil/sediment samples collected from shallow pools atop the CELA. Surface runoff of these contaminants to the Genesee River is a major pathway of contamination. However, since the Landfill Site is fenced off, direct human contact with the surface contamination is limited.

10. Comment: Partial channelization of Genesee River as proposed in Alternative VIII should be carefully designed to control the flooding and erosion of the RCRA capped CELA.

Response: When remedial measures for the Landfill Site are designed, all necessary measures will be taken to provide adequate protection to prevent the flooding and erosion of the RCRA capped landfill.

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233-0001

Henry G. Williams
Commissioner

SEP 25 1985

Mr. Donald A. MacFarquhar, P.E.
Director of Public Works
Village of Wellsville
Municipal Building
156 North Main Street
P.O. Box 591
Wellsville, New York 14895

Dear Mr. MacFarquhar:

Re: Feasibility Study of the Landfill
Site-Sinclair Refinery Site,
Wellsville, New York

Thank you for your September 6, 1985 letter offering comments on the subject report.

As I discussed with you in person on September 17, 1985 in Albany, New York, the New York State Department of Environmental Conservation (NYSDEC) developed and evaluated three additional alternatives. These three alternatives are briefly described in Enclosure 1. Please refer to Mr. Bruce Bentley's September 19, 1985 letter to you for more details of these alternatives.

In response to the Environmental Protection Agency's (EPA) request and in the interest of securing the funding for Remedial Design during the 1985 Federal fiscal year, after detail evaluation of all alternatives, the NYSDEC recommended Alternative VIII-Relocation of SLA to CELA, RCRA Cap and partial channelization up to the borrow pit area, south of the CELA for the following reasons:

- The NYSDEC feels that partial channelization provides stable and adequate rip-rap banks along both sides and eliminates the threats of landfill erosion and flood inundation.
- Relocation of the contents of the SLA to CELA and filling and regrading SLA with clean fill would enhance the source control measure by reducing the landfill area.
- Relocation of the contents of the SLA to CELA eliminates/reduces leachate generation currently calculated to be 1,700 gallons per day.
- Relocation of the contents of the SLA to CELA provides a greater distance of separation between the SLA wastes and the groundwater. Also, the soil beneath the CELA is less pervious than the soil beneath the SLA, adding better protection against migration of SLA contaminants to the groundwater.

- The RCRA Cap, which incorporates clay liner, geofabric and drainage layer for leak detection, is designed to prevent essentially all infiltration of rain water into the landfills. The NYSDEC feels that clay caps with geotextile and lateral drainage layers have a lower potential for failure.

As you pointed out in your letter, there is little leachate formation and a very slow groundwater migration rate. However, during the Feasibility Study for the refinery portion of the site, need for groundwater control at the landfill site will be studied; if such need is demonstrated, a cost-effective groundwater control at the landfill site will be considered as a remedial measure.

It is expected that the EPA will write a Record of Decision selecting a cost-effective remedy for the landfill site by September 30, 1985. You will be notified of the selection of the remedy after it is made by the EPA. If you have any questions, please contact me at (518) 457-4343.

Sincerely,

C. Vasudevan

Chittibabu Vasudevan, Ph.D., P.E.
Project Engineer
Bureau of Western Remedial Action
Division of Solid and Hazardous Waste

Enclosure

cc: w/enc.: G. Pavlou, USEPA-Region II
J. Singerman, USEPA-Region II
S. Rosenthal, SMC Martin

ENCLOSURE 1

ADDITIONAL ALTERNATIVES - VII, VIII, IX

Alternative VII - RCRA Cap, Partial River Channelization

This alternative combines a source control measure with a migration management technology to produce a system attaining applicable public health/environmental criteria. This alternative provides a clay liner, geofabric, and leak detection layed on the surface of the Central Elevated Landfill Area (CELA) and the Southern Landfill Area (SLA).

The other feature of this alternative is the partial channelization of the Genesee River from a point roughly opposite the southern tip of the SLA to the existing flood control structures below the northern tip of the landfill site. This feature widens the river in two stages and moves the river channel away from the landfill site. For a schematic description of this river channelization, please refer to Figure 3-12 and Appendix C-3-3 of the Feasibility Study report, dated August 1985.

Alternative VIII - Relocation of SLA to CELA, RCRA Cap the CELA, Partial River Channelization

NYS DEC IS RECOMMENDING THIS ALTERNATIVE. Like alternative VII, this alternative combines a source control measure with a migration management technology, producing a system attaining applicable public health/environmental criteria. The contents of the SLA would be excavated and placed on top of the contents of the CELA. The area of the SLA would be filled and regraded with clean fill from off-site. The surface of the combined landfill in the CELA would be graded, covered with a RCRA cap and revegetated. The RCRA cap would be of the same characteristics as for alternative VII (clay liner, geofabric, and leak detection).

The other feature of this alternative is the partial channelization of the Genesee River from the borrow pit area (south of the CELA) to the existing flood control structures below the northern tip of the landfill site. As in the case of Alternative VII, this feature widens the river and moves the river channel away from the landfill site. For schematic description of this river channelization, please refer to Figure 3-12 and Appendix C-3-3 of the Feasibility Study report dated August 1985.

Alternative IX - Relocation of SLA to CELA, RCRA Cap, the CELA, Full Channelization

This alternative combines a source control measure with a migration management technology, producing a system attaining applicable public health/environmental criteria. The source control measure is identical to that for Alternative VII; excavation and placement of the contents of the SLA on top of the CELA, filling the SLA with clean fill material and capping the CELA with a RCRA cap and revegetation.

However, the migration management technology, for this alternative, Full Channelization is more redundant than Partial Channelization. As opposed to Partial Channelization, Full Channelization maintains a uniform width of 160 feet from the borrow pit area (south of CELA) to the existing flood structures below the northern tip of the landfill site. As in the case of other two Alternatives (VII, VIII), this feature moves the river channel away from the landfill site. For schematic description of this river work, please refer to Figure 3-1 and Appendix C-3-2 of the Feasibility Study report dated August 1985.

VILLAGE OF WELLSVILLE
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September 6, 1985

Dr. Chittibabu Vasudevan
New York State
Department of Environmental Conservation
50 Wolf Road
Albany, N.Y. 12233-0001

Dear Dr. Vasudevan:

We have reviewed SMC Martins report "Feasibility Study for the Sinclair Landfill Site" and wish to offer our comments. We agree that options II and IV included in Table E-4, Matrix Summary of Landfill Site Remediation Alternatives are technically acceptable and cost effective and will, when combined with a new water intake, provide an environmentally sound solution to the problems of the Sinclair Landfill Site.

It is our feeling that the greatest potential for the migration of pollutants from this site will occur in a flood environment and consequently feel that full channalization allowing for right bank overflow is an important element of an acceptable solution.

The report concludes that there is little leachate formation and a very slow ground water migration rate. Addition of the RCRA Cap should further minimize infiltration and ground water migration.

Slurry walls add another measure of insurance against off site ground water migration but they do not appear to be absolutely necessary given the present low migration rates. If slurry walls are not included what is the future potential for leachate discharge from the site and how would it be handled?

Yours truly,

D.A. MacFarquhar, P.E.
Director of Public Works

DM/tl

RECEIVED

SEP 10 1985

BUREAU OF WESTERN REMEDIAL ACTION
[illegible]
HAZARDOUS WASTE

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233-0001

1985 NYS Forest Preserve Centennial 100

Henry G. Williams
Commissioner

SEP 25 1985

Mr. Arthur F. Pope
Manager, Environment and Health
ARCO Petroleum Products Company
515 South Flower Street
Box 2679 - T.A.
Los Angeles, CA 90051

Dear Mr. Pope:

RE: Feasibility Study of the Landfill Site
Sinclair Refinery Site, Wellsville, New York

Thank you for your September 13, 1985 letter received by this office via telecopier on September 17, 1985.

Enclosed are the Department's responses to your comments on the subject study. The responses are numbered in accordance with the numbering of your letter and enclosure of September 13.

If you have any questions, please contact me at 518-457-4343.

Sincerely,

Chittibabu Vasudevan, Ph.D., P.E.
Senior Sanitary Engineer
Bureau of Western Remedial Action
Division of Solid and Hazardous Waste

Enclosure
cc: w/incoming and w/enclosure
G. Pavlou, USEPA, Region II
J. Singerman, USEPA, Region II
S. Rosenthal, SMC Martin Inc.

RESPONSES TO ARCO'S COMMENTS CONCERNING
DRAFT - FEASIBILITY STUDY FOR
SINCLAIR LANDFILL SITE, WELLSVILLE, NEW YORK

RESPONSES TO GENERAL COMMENTS

1. Relocation of the Wellsville's raw water intake to upstream of the site addresses the public health threat to the public water supply. The relocation of raw water intake does not address the threat of surface water contamination. The environmental contamination and other health concerns from the Landfill Site are assessed by the Feasibility Study Report which evaluates several remedial technologies and alternatives in order to identify cost-effective remedial measure(s) for the Landfill Site.
2. The primary objective of the Remedial Investigation (RI) at the Landfill Site was to characterize the nature and extent of the contamination present at the Landfill Site; the objective of the Feasibility Study (FS) is to evaluate remedial technologies and alternatives to identify cost-effective remedial measure(s) to protect the public health and environment from the contamination. At the Sinclair Site, the southernmost portion of the property was used as a waste dump for a variety of materials. Landfill activities occurred throughout operational history of the refinery, spanning greater than 58 years. The larger landfilled area (9.2-acres) is referred to as the Central Elevated Landfill Area (CELA) and the area to the south (2.3-acres) is called the South Landfill Area (SLA). These two (2) landfill areas are seperated by an area reportedly used as a borrow source. Landfill activities apparently continued long after the closure of refinery opeations.

Aerial photographic evidence from 1964, 1970, 1974 and 1982 indicated that lagoon dredging, trench backfilling, additional landfilling and general regrading occurred throughout this period. Additional landfilling appears to be most extensive in the south landfill area between the years 1970 and 1974. Adequate investigation of disposal activity and subsequent land use after 1958 has been conducted to aid in designing the remedy for the Landfill Site.

RESPONSES TO SPECIFIC COMMENTS

I. Executive Summary

1. Because lateral and vertical movement of groundwater through the waste matrix of the CELA is limited and lateral drainage from SLA to the Genesee River via the upper aquifer is approximately 1,600 gallons/day, it is concluded that a pathway of significant contaminant migration between the waste/soil and the groundwater does not appear to exist at this time. The last sentence of Point 3 on Page E-2 should read: "A pathway of significant contaminant migration between the waste/soil and the groundwater does not appear to exist." However, during the Feasibility Study for the refinery portion of the site, need for groundwater control at the Landfill Site will be studied; if such need is demonstrated, a cost-effective groundwater control at the Landfill Site will be considered as a remedial measure.
2. Please add the following sentence to Point 6 on Page E-2 "Chemical analyses of the samples taken from the waste drums indicate that very few contaminants were present in the drummed material."

II. Introduction

1. Table 1-1 on Pages 1-9 reports that approximately 500 gallons/week, not 500 gallons/day, of tank sludges were deposited in the Sinclair Refinery Landfill. This information is based on interviews with former employees of the Sinclair Refinery.
2. The objective of the FS is to identify cost-effective remedial measure(s) to remediate the Landfill Site. The extent of the remedial measure partly depends on the magnitude of the contamination. Highest concentrations are indicative of the magnitude of the contamination and hence these are presented.
3. The terms, significant, minor amounts, high concentrations, excessively high, are to be simply viewed as qualitative. Generally these terms are used with reference to background concentration values of the contaminants. The statement on Page 1-27 "The concentrations of most of the metals in the surface water and groundwater were either not detected or had concentrations under 30 ppb (with the anomalous exception of zinc which was 4,100 ppb in one groundwater sample, possibly due to contact with the galvanized steel well casing)." should be replaced by: "The concentrations of most of the metals in the surface water and groundwater were either not detected or had concentrations under 0.32 ppm (with the anomalous exception of zinc which was 2.64 ppm in one groundwater sample possibly due to contact with the galvanized steel well casing)." The above statement summarizes the data presented in Table 1-5 for metals in groundwater and surface water.

4. This FS Report was prepared in accordance with the Environmental Protection Agency's (EPA) Guidance on Feasibility Studies under CERLA, April 1985. This guidance calls for the presentation of site background, nature and extent of the problems prior to the presentation of criteria and standards. The FS Report follows the EPA's guidance.
5. The FS Report does refer to the results from analyses of air samples collected during the RI and suggests that contamination of the air medium has not occurred (Page 1-46). Page 1-47 of the report refers to the biological tests. Details of the bilogical tests may be found in the Phase I Remedial Investigation Report, dated March 1985.
6. The comment refers to the risk assessment of human exposure of the chemicals. The objective of the FS Report is to identify cost-effective remedial measures. The remedial criteria were developed to be consistent with the objective of remediating the Landfill Site.
7. The New York State Department of Health (NYSDOH) has established 5 ug/l of benzene as maximum allowable limit in potable water. The non-detectable criteria for benzene is in accordance with class GA groundwater quality standard from 6 NYCRR, Part 703, based on best use as source of potable water supply.
8. An example of the mathematical method to calculate soil criteria is provided in Enclosure 1.

9. The long-term Environmental/Public Health impact as outlined on Page 2-5 was utilized to evaluate each remedial alternative's (which is a combination of complementing technologies) effectiveness to meet the remedial criteria and objectives as outlined in Section 1.6 in addition to the environmental and health issues associated with the implementation of the remedial alternative.

ENCLOSURE 1
AN EXAMPLE OF THE MATHEMATICAL METHOD TO CALCULATE SOIL CRITERIA

Reference: Kenaga, E. E., and Goring, C.A.I., "Relationship Between Water Solubility, Soil Sorption, Octanol - Water Partitioning, and Concentration of Chemiclas in Biota." Special Technical Publication 707-ASTM, pp: 78-115,1980

Definition: The "soil sorption coefficient" (Koc) or "partition coefficient" is the concentration of chemical sorbed by the soil expressed on a soil organic carbon basis divided by the concentration of chemical in soil water.

° There is abundant evidence that neutral organic substances are sorbed principally by soil organic matter and that distribution coefficients are useful for judging their relative susceptibility for leaching.

° Despite the complexity of the sorption process in soil, a good relationship has been found between the organic matter of soils and their capacity to sorb most organic chemicals.

° Variability in sorption coefficients expressed on the basis of the organic carbon content of soil can be expected more for ionic organic chemicals than for non-ionic organic chemicals.

° Despite the above-mentioned limitations in soil sorption coefficients based on the organic content of soil, they represent the best way currently available for comparing the sorption characteristics of chemicals and development of soil criteria in the absence of any documented soil criteria.

° The relationship:

$\log Koc = 3.64 - 0.55 (\log S)$-------(1)

Where S= water solubility of the chemical (ppm)
correlation coefficient "r" = - 0.84
n= number of compounds used = 106

The 95 percent confidence limit for the calculated value is ± 1.24 orders of magnitude

$Cs = Koc \times f \times Cw$-------(2)

Where Cs = soil criteria in pbb

Cw = surface water/groundwater criteria in ppb

f = organic carbon in the soil expressed as a fraction

° Organic carbon content is assumed for the site as 1/20

Note: log is the logrithm co the base of 10.

Enclosure 1

(Continued)

Given Data:

Example 1:

Chemical: 4.4' - DDD

Water Solubility (S) = 0.160 ppm

Water Criteria (Cw) = 0.001 ppb

Organic Carbon Content = 0.05

Substituting the S value in Equation 1, Koc is calculated to be 11,960; subsituting Koc, f and Cw in Equation 2, Cs is calculated to be 0.6 ppb.

Example 2:

Chemical: 4,4' - DDE

S = 0.0013 ppm

Cw = 0.001 ppb

Using the same procedure as for Example 1,

Koc = 168,784

Cs = 8.4 ppb

Observation:

- Inverse relationship between water solubility and partition coefficient.
- An organic chemical with higher solubility is more leachable from the soil than a low soluble organic compound.

ARCO Petroleum Products Company
515 South Flower Street
Mailing Address: Box 2679 - T.A.
Los Angeles, California 90051
Telephone 213 486 3511

September 13, 1985

Dr. Chittibabu Vasudevan
New York State
Department of Environmental Conservation
50 Wolfe Road
Albany, NY 12233-0001

Dear Dr. Vasudevan:

Attached are ARCO Petroleum Products Company comments on the draft report entitled, "Feasibility Study for Sinclair Landfill Site, Wellsville, New York."

Our major concern with this study is that it does not consider the impact of the potential relocation of the City's drinking water intake on the proposed remedial measures. With relocation of the intake, the apparent driving force to take extensive remedial action at the landfill is signficiantly reduced.

A second general concern is that the state continues to associate all the waste types, volumes and contaminants found in the landfill with past refinery operations and neglects over twenty five years of disposal, and industrial and other use of the property by as yet unidentified parties after the refinery closed. We have also attached a number of specific comments for your consideration.

If you have any questions, please contact Mr. David Smith of my staff at (213) 486-1913.

Sincerely,

A. F. Pepe
Manager, Environment & Health

AFP/mr

cc: D. A. Smith AP 3319

ARCO Petroleum Products Company

Comments on The Draft Feasibility Study for Sinclair Landfill Site

Wellsville, New York

General Comments

1. The draft report does not consider the impact of the potential relocation of the Wellsville's drinking water intake to upstream of the site. The report neither identifys it as a potential remedial measure nor considers the possible reduction in the nature of remedial action needed. The impact of relocation of the intake should be incorporated into the final report.

2. Neither the RI or FS attempts to identify materials disposed in the landfills after the closure of the refinery in 1958. All the waste types, volumes and contaminants are erroneously associated solely with past refinery operations. Twenty seven years of disposal activity and uses of the property by others have been overlooked by these reports. The final RI/FS reports should include a comprehensive investigation of disposal activity and subsequent land use after 1958.

Specific Comments

I. Executive Summary

1. Statements in the third and eighth point of the Executive Summary appear to contradict one another. Point three states: "A pathway of contaminant migration between the waste/soil and the ground water does not appear to exist." Point eight states ". . . . leachate migrating from the SLA would total approximately 1700 gallons/day." How can 1700 gallons/day migrate if there is no pathway? Please clarify.

2. Point 6 should reflect the conclusion on pages 1-29 thru 1-30 that very few contaminants were present in the drummed material.

II. Introduction

1. Neither the Remedial Investigation (RI) or Feasibility Study (FS) supports the findings in Table 1-1 that 500 gallons/day of tank sludges, and several dump truck loads daily of oil-soaked soil and sludges were disposed at the landfill. The reported volumes should be deleted.

2. In describing the nature and extent of the landfill's problem in Section 1.5 the worst case scenario has been presented, (i.e., highest detected concentrations are reported). We believe it is misleading to only define the extent/nature of a problem thru the worst case. There is no direction in either the National Contigency Plan or EPA's "Guidance on Feasibility Studies under CERCLA, April 1985" that suggests such an approach is necessary or advisable. The report in some cases exaggerates the problems by at least 2 or 3 times. For example:

Reproduced from best available copy.

ARSENIC CONCENTRATIONS, ppb

Media	Draft FS	Actual Range in RI	Average
Subsurface Soils	51	17.6-51	23
Surface Soils	74	24-74	41

Therefore, we recommend the draft FS be revised to more accurately represent the contaminant concentrations actually found at the landfill by presenting concentration ranges and averages.

3. Throughout the description of the landfill problems in Section 1.5 qualitative statements without adequate basis or criteria are used to evaluate contamination. For example:

    a. Page 1-23. "Priority pollutant's are present in significant quantities." What is significant and why?

    b. Page 1-25. "Four media displayed relatively minor amounts of . . ." What is minor and why?

    c. Page 1-27 ". . . had concentrations under 30 ppb. . ." Why is 30 ppb important?

    d. Page 1-34 ". . . compounds detected in high concentrations..." What is high and why are they considered important?

    e. Page 1-46 ".. selected metals are excessively high..." what is excessively high, and is it important?

4. Section 1.5 should be revised to present the criteria and standards, by which the analytical data is to be evaluated. The data should be clearly and accuratedly presented (see Comment No. 2.) Finally, the nature and extent of the problem should be described relative to the selected criteria.

5. The discussion of Airborne Contaminant Transport in Subsection 1.5.5 makes no reference to the three air quality samples taken directly over the landfill. Similarly, the discussion makes no reference to the biological tests of the animal population in the area. Subsection 1.5.5 should be revised to include the findings from both these tests.

6. For a given chemical (i.e., arsenic) the same enironmental criteria and standards are to be used for all three pathways into the human body (i.e., skin absorption, injestion, or inhalation). This is inconsistent with the draft EPA January 24, 1985 document entitled, "Public Health Process, Procedural Manual". This document clearly indicates that when evaluating the hazards/risks to the public for a given chemcial, different criteria for the three exposure pathways are appropriate and necessary. The FS should evaluate and use, when appropriate, different criteria for the three exposure pathways.

7. Table 1-10, page 1-49 presents the criteria for groundwater and surface water. The nondectectable (ND) criteria for benzene is inconsistant with the 5.0ug/l guideline used in reporting river water benzene analysis to the public, and referred to in the April 29, 1985 final report entitled, "Cancer Incident in Wellsville, N. Y. Final Report".

8. An example of the mathmatical method used to calculate soil criteria from drinking water criteria should be provided and any assumptions used in the caluclation should also be highlighted.

9. The screening of the alternate technologies in Section 2.2.2 should be expanded to assess how successfully the technologies eliminate the alleged landfill problems identified in Section 1.5. The Environmental and Public Health screenings criteria discussed in Section 2.1.2 only addresses environmental and health issues associated with implementing the technologies, (i.e., generation of dust, fumes, odors) rather then the alleged problems of Section 1.5.